

Total No. of Questions : 12]

SEAT No. :

P1674

[4859]-1

[Total No. of Pages : 3

B.E. (CIVIL)

ENVIRONMENTAL ENGINEERING-II

(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q3 or Q4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q11 or Q.12 from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss in details separate and combined systems of sewerages with their merits and limitations. [6]
- b) The BOD of sewage incubated for one day at 30°C has been found to be 200m/lit. What will be 5 day BOD at 20°C? Assume $K=0.12$ (base10) at 20°C. [6]
- c) Differentiate between sanitary sewage and Industrial wastewater. [4]

OR

- Q2)** a) Design a sanitary sewer for the following data: [6]
- i) Population=100000persons.
 - ii) Rate of water supply=140 lit/capita/day.
 - iii) $N=0.013$
 - iv) Peak factor = 2.5
 - v) Slope = 1 in 850
- b) Explain procedure of C.O.D. test. [6]
- c) Explain with neat sketch 'Drop manhole'. [4]

P.T.O.

- Q3)** a) Discuss the different modifications in Activated sludge process. [6]
 b) Design an activated sludge process for following data: [12]
- | | | |
|---|---|----------------------------|
| i) Municipal wastewater flow rate | = | 15,000 m ³ /day |
| ii) BOD of settled effluent | = | 200mg/lit. |
| iii) BOD of treated effluent | = | 5 mg/lit. |
| iv) Yield coefficient, Y | = | 0.5 kg/kg. |
| v) Endogenous decay coefficient, kd | = | 0.05 d ⁻¹ |
| vi) MLSS, X | = | 3000mg/lit. |
| vii) Return sludge solids concentration, X _r | = | 15,000mg/lit. |
| viii) Mean cell residence time, θ _c | = | 10 days |

Determine:

- 1) Volume of reactor.
- 2) F/M ratio.
- 3) Volumetric loading rate.
- 4) Oxygen requirement.
- 5) Recycle ratio.
- 6) BOD removal efficiency.

OR

- Q4)** a) Design a high rate trickling filter using N.R.C. equation for following data: [12]
- | | | |
|--------------------------------------|---|------------|
| i) Sewage flow | = | 15 Mld. |
| ii) Recirculation ratio | = | 1.5 |
| iii) BOD | = | 200mg/lit. |
| iv) BOD removal in primary clarifier | = | 35% |
| v) Final effluent BOD desired | = | 20mg/1. |

- b) Explain the two stage Trickling filter with neat flow diagram. [6]

- Q5)** a) With the help of neat sketch explain Oxygen Sag Curve.. [6]
 b) What are the natural forces acts for the purification of streams? [6]
 c) Explain different treatment units in preliminary treatment of waste water. [4]

OR

- Q6)** a) Design a grit chamber for the following data: [6]
- i) Maximum flow: 30 MLD
 - ii) Diameter of particle to be removed: 0.2 mm and more.
 - iii) Specific gravity of particle: 2.65.
 - iv) Average temperature: 20°C.
- b) Design bar screen for a peak flow of 60 million liters per day. [6]
 c) Write a short note on proportional flow weir. [4]

SECTION - II

- Q7)** a) Discuss different chemical treatment options for Industrial wastewater. [6]
b) Write in details design parameters of aerated lagoons and mention the advantages and disadvantages of the same. [6]
c) Define: [4]
i) MLSS and
ii) MLVSS

OR

- Q8)** a) Explain the algal Bacterial symbiosis. [6]
b) Write short note on Oxygen sag curve. [4]
c) Write about constructional details and design criteria of oxidation ditch. [6]

- Q9)** Design a septic tank to treat sewage from a working women hostel of 2500 residents. Water supply rate 130 lpcd [16]
Draw a neat sketch giving plan elevation of a septic tank designed above. Also design and draw a soak well for the above septic tank considering percolation capacity of the filter media say 1250 L/m³ day. Assume all other required data.

OR

- Q10)** Explain with the help of neat sketch of conventional sludge digester and explain the following:-
Different stages of the digestion process.
Design parameters of anaerobic digester.
Capacity of the digester. [16]

- Q11)** With the help of manufacturing flow diagram, explain the sources of wastewater generation from sugar industry. Also discuss its characteristics and treatment options with the help of neat sketch. [18]

OR

- Q12)** With the help of manufacturing flow diagram, explain the sources of wastewater generation from Textiles industry. Also discuss its characteristics and treatment options with the help of neat sketch. [18]



Total No. of Questions : 12]

SEAT No. :

P1681

[4859]-10

[Total No. of Pages : 3

B.E. (Civil)

b-HYDROINFORMATICS

(Elective-II) (2008 Course) (Semester - I) (401005)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer-books.*
- 2) *Your answer will be valued as a whole.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Answer suitable data, if necessary.*
- 6) *Answer three questions from section-I and three questions from section-II.*

SECTION - I

- Q1)** a) Define Hydroinformatics. What is the necessity of Hydroinformatics? Explain with practical example. [6]
- b) What are components of hydroinformatics systems? Explain in detail hardware and software components. [6]
- c) Discuss about design of hydroinformatics system for flood warning in your city. [6]

OR

- Q2)** a) What are network components, peripheral components of a Hydroinformatics system? Explain in brief. [6]
- b) Discuss any web based hydroinformatics system in India or abroad giving details about scope, purpose, underlying model, software used in front end and back end. [8]
- c) Explain role of numerical modeling in Hydroinformatics. [4]

- Q3)** a) Why multi-criteria decision support systems are required in Hydraulic Engineering? Discuss interrelation between various components of multi-criteria decision support system. [8]
- b) Discuss design of multi-criteria decision support system for wave watch giving details of information collection, analysis, prediction, estimation, decision-dissemination of the information. [8]

OR

P.T.O.

- Q4)** a) What is a decision support system in water resources engineering? What are its components? What is the role of public sector in decision support system? [8]
- b) Discuss design of multi-criteria decision support system for flood watch giving details of information collection, analysis, prediction, estimation, decision, dissemination of the information. [8]

- Q5)** a) Differentiate between physics based modeling and data driven modeling. Give examples of each. [6]
- b) Discuss design of simulation model for household water distribution system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [10]

OR

- Q6)** a) Discuss any commercial simulation model. [6]
- b) Discuss design of simulation model for water inflow at a dam location objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [10]

SECTION - II

- Q7)** a) Discuss the working of biological neuron. [4]
- b) What is learning rate? What is momentum factor? [6]
- c) How artificial neural networks compare with Statistics? What is the terminology used in statistics for the following terms used in ANN? Input, output, training, generalization. [8]

OR

- Q8)** a) Discuss the working of an artificial neuron. [4]
- b) Define epoch, epoch size, error function, weight surface. [6]
- c) Define transfer function. What is its use in ANN? Discuss various transfer used in ANN. [8]

- Q9)** a) What is evolutionary computing? Explain 3 criteria for evolutionary process to occur. What are different types of evolutionary computing? [8]
- b) Discuss fitness function, population, terminals and functions in connection with the Genetic Algorithm. [8]

OR

- Q10)** a) What is mutation and cross over? Give an example of both by drawing the tree diagram. [8]
- b) What are the steps in implementation of Genetic Algorithm? [8]

- Q11)a)** What are strengths and limitations of Artificial Neural Networks. [8]
- b) Define soft computing techniques. Is Genetic Algorithm a soft computing technique? Why? What is the difference between Genetic Algorithm and Genetic programming? [8]

OR

- Q12)a)** Discuss a study about application of Artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. [8]
- b) Discuss a study about application of Genetic Algorithm in water Resources Engineering giving details about problem definition, objective, data, inputs, outputs and results. [8]



Total No. of Questions : 12]

SEAT No. :

P1745

[4859]-100

[Total No. of Pages :4

B.E. (E&TC)

OPTICAL FIBER COMMUNICATION

(2008 Course) (Semester - II) (404188)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2,Q3 or Q.4,Q5 or Q.6 from section-I and Q.7 or Q.8,Q9 or Q.10,Q.11 or Q.12 from section-II.*
- 2) *Answer to the two sections must be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data wherever necessary.*

SECTION-I

- Q1) a)** With reference to mode theory for optical propagation explain the following terms: **[6]**
- i) Phase velocity
 - ii) Group velocity
 - iii) Group delay
- b)** Compare: **[6]**
- i) Multimode and single mode fibers
 - ii) Step Index and graded Index fibers.
- c)** An optical fiber with 25 μ m core radius has core refractive index 1.48 and relative refractive index difference of 0.01. **[6]**
- i) Calculate the value of normalized frequency and the number of modes that can propagate through this fiber, if the wavelength of operation is 1310nm.
 - ii) Calculate the percentage of optical power flow in the cladding.
 - iii) If the relative refractive difference is reduced to 0.001, how many modes are supported by the fiber and what fraction of the optical power flows in the cladding?

OR

P.T.O.

- Q2)** a) A graded index fiber with parabolic index profile supports the propagation of 742 guided modes. The fiber has numerical aperture in air of 0.3 and core diameter of 70 μm . Determine the wavelength of light propagating in the fiber. Also estimate the new maximum core diameter for single mode operation at same wavelength. [6]
- b) Explain any one fiber fabrication method with a neat diagram. [6]
- c) Velocity of light in the core of step index fiber is $2 \times 10^8 \text{m/sec}$ and critical angle at core-cladding interface is 80° . Determine numerical aperture and acceptance angle for the fiber in the air, assuming it has core diameter suitable for consideration by ray analysis. [6]

- Q3)** a) Explain the various loss mechanisms in optical fibers in detail. [8]
- b) A continuous 40 km long optical fiber link in a test setup has a loss 0.4 dB/km. [8]
- i) What is the minimum optical level that must be launched into the fiber to maintain an optical power level of $2 \mu\text{W}$ at the receiving end?
- ii) What is the required input power if the fiber has a loss 0.6 dB/km?

OR

- Q4)** a) What is dispersion? Explain the various dispersion mechanisms that are observed in multimode and single mode optical fibers. [8]
- b) Explain [8]
- i) DSF
- ii) NZDSF
- iii) Dispersion flattened fiber and
- iv) PM fibers.

- Q5) a)** Explain the mechanism of optical feedback to provide oscillation and hence amplification within the laser. [8]

The longitudinal modes of GaAs injection laser emitting at a wavelength of $0.87 \mu\text{m}$ are separated in frequency by 278 GHz. Determine the length of the optical cavity and the number of longitudinal modes emitted. Consider the refractive index of GaAs as 3.6.

- b) Explain the various modulation schemes applicable to optical sources. [8]

OR

- Q6) a)** Draw and explain LED drive circuits for digital and analog communication. [8]

- b) Draw and explain the principle of working and characteristics of LASER. [8]

SECTION - II

- Q7) a)** For the wavelength range $1300 \text{ nm} < \lambda < 1600 \text{ nm}$, the quantum efficiency for InGaAs is around 90%. [6]

- i) Calculate the responsivity at 1300 nm;
ii) Calculate the cutoff wavelength of this detector considering the energy gap of InGaAs as $E_g = 0.73 \text{ eV}$.
iii) State the reason for the rapid decrease in responsivity for smaller wavelengths.

- b) Explain the principle of working and characteristics of photo transistor. [6]

- c) Draw and explain the generic front-end amplifier structures in receivers. [6]

OR

- Q8) a)** A silicon based avalanche photo diode has a quantum efficiency of 65% at a wavelength of 900nm. Optical power of $0.5 \mu\text{W}$ produces a multiplied photocurrent of $10 \mu\text{A}$. Calculate. [6]

- i) Primary photo current and ii) Multiplication factor M.

- b) Explain the principle of working and characteristics of avalanche photo diode. [6]

- c) Write short note on: Noise considerations in p-n, p-i-n and APDs. [6]

Q9) a) Draw the block diagram of optical fiber communication link. Explain the system design considerations in a point-to-point optical fiber communication link. [8]

b) Using graphical method calculate the maximum attenuation-limited transmission distance of the following two systems operating at 100Mb/s: [8]

System I operating at 850 nm

- i) GaAlAs laser diode: 0dBm fiber-coupled power.
- ii) Silico APD with -50 dBm sensitivity.
- iii) Graded-index fiber: 3.5 dB/ km attenuation at 850 nm.
- iv) Connector loss: 1dB/connector.

System II operating at 1300 nm

- i) InGaAsP LED diode: 13dBm fiber-coupled power.
- ii) InGaAs pin photodiode with -38dBm sensitivity.
- iii) Graded-index fiber: 1.5 dB/km attenuation at 1300 nm.
- iv) Connector loss: 1dB/connector.

Allow a 6 dB system operating margin in each case. Comment on the result.

OR

Q10)a) Explain in detail: Multichannel transmission system. [8]

b) Explain in detail: Rise time Budget [8]

Q11)a) Explain the principle of operation of Erbium Doped Fiber Amplifiers (EDFA) with a neat diagram. Comment on the gain and noise in EDFA. [8]

b) Draw a block diagram of a WDM optical system. Explain the technique of wavelength division multiplexing. [8]

OR

Q12)a) Write short note on: WDM couplers and their properties. [8]

b) Compare between SOA and EDFA. Comment on the selection criteria of such amplifiers. [8]



Total No. of Questions : 12]

SEAT No. :

P1746

[4859]-101

[Total No. of Pages : 3

B.E. (E&TC)

a-SOFT COMPUTING

(2008 Course) (Elective-III) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) What are the basic components of artificial neural networks? Explain various network topologies. **[6]**
- b) Design a neural networks with only one M.P. neuron that implements the three basic logics. **[12]**
- i) NOT (X_1)
 - ii) OR (X_1X_2)
 - iii) NAND (X_1X_2) where $X_1 \& X_2 \subset (0,1)$

OR

- Q2)** a) Describe the perception learning rule? Justify the statement “single layer perception cannot represent exclusive-OR”. What are advantages of MLP? **[10]**
- b) What is the activation function used in RBF network? Explain training algorithm of RBF network. **[8]**

- Q3)** a) State the various applications of neural networks? Explain the application of neural network in Image processing field. **[8]**
- b) Describe in detail the application of ANN to communication. **[8]**

OR

P.T.O.

Q4) a) With suitable case study, Explain how neural network best performs its control action. [8]

b) What is distinction between learning equation & learning law? Compare LMS, perception & delta learning law. [8]

Q5) a) Describe adaptive neuro-fuzzy interference system? [8]

b) Describe a variety of adaptive learning mechanisms that can be used for both adaptive FIS &RBFN [8]

OR

Q6) a) Explain hybrid learning algorithm use in ANFIS. [8]

b) With suitable sketch & mathematical equation define. [8]

i) Trapezoidal membership function

ii) Triangular membership function

iii) Gaussian membership function

iv) Generalized bell membership function

SECTION - II

Q7) a) Define soft computing & Explain its constituents. [8]

b) What are different fuzzy sets? Define them? What are the role of ∞ -cuts in fuzzy set theory. [8]

OR

Q8) a) Explain the characteristics of soft computing frame network. [8]

b) What are the operations of fuzzy sets? Explain with examples. [8]

Q9) a) Consider two given fuzzy sets [8]

$$A = \left\{ \frac{1}{2} + \frac{0.3}{4} + \frac{0.5}{6} + \frac{0.2}{8} \right\}$$

$$B = \left\{ \frac{0.5}{2} + \frac{0.4}{4} + \frac{0.1}{6} + \frac{1}{8} \right\}$$

Perform union, intersection, difference & complement over Fuzzy set A&B.

b) Explain: [8]

- i) Mamdani inference mechanism
- ii) Tsukamoto inference mechanism

OR

Q10)a) Two fuzzy relations are given by [8]

$$\underline{R} = \begin{matrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{matrix} \quad \& \quad \underline{S} = \begin{matrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{matrix}$$

Obtain fuzzy relation T as a composition between the fuzzy relations.

b) What is the necessity of composition of relation? What are the various types of composition techniques. [8]

Q11)a) What is fuzzy logic controller? With neat block diagram explain the architecture of FLC. [8]

b) Explain the stems involved in designing of FLC? What are the principle design elements necessary for the design of general FLC? What is the effectivity of FLC. [10]

OR

Q12) Write short notes on (any three) [18]

- a) Synthesis & validations of a fuzzy controller.
- b) Conventional AI to computational intelligence
- c) Use of ANN for process control
- d) Un supervised neural networks



Total No. of Questions : 12]

SEAT No. :

P1747

[4859]-102

[Total No. of Pages : 3

B.E. (E & TC)

b-SPEECH PROCESSING

(2008 Course) (Elective-III) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q3 or Q.4, Q5 or Q.6, Q7 or Q.8, Q9 or Q10, Q.11 or Q12.*
- 2) *Answers to the two sections should be written in separate books.*

SECTION-I

- Q1)** a) Draw the LTI model of speech production system and explain. [9]
b) Explain the method to separate voiced, unvoiced & silence part of speech signal using time domain features. [9]

OR

- Q2)** a) What is phonem? Explain classification of acoustic phonetics in detail. [9]
b) Define pitch? Explain the method to estimate pitch using autocorrelation method & average magnitude difference function. Also compare them. [9]

- Q3)** a) Explain the method to estimate pitch using LPC analysis. [8]
b) Explain the method to find LPC coefficients using autocorrelation method. [8]

OR

- Q4)** a) Explain Levinson Durbin algorithm to find solution of autocorrelation equation. [8]
b) Explain the method to find LPC coefficients using Cholesky decomposition method. [8]

- Q5)** a) What is formant? Explain the method to estimate formant using cepstrum analysis. [8]
b) What is homomorphic speech processing? Explain with block schematic. [8]

OR

P.T.O.

- Q6)** a) What is Mel Frequency Cepstral Coefficient (MFCC) and what are applications of MFCC in speech processing? Explain it with block schematic. [8]
- b) Explain the method to find impulse response of vocal tract using cepstrum analysis. [8]

SECTION - II

- Q7)** a) What is speech enhancement? Explain spectral subtraction method of speech enhancement in detail. [8]
- b) What is wiener filter? Explain the method of speech enhancement using wiener filtering. [8]

OR

- Q8)** a) Explain the method of speech enhancement by re-synthesis method? Also state the advantages of re-synthesis method over other methods. [8]
- b) Compare different methods of speech enhancement. [8]

- Q9)** a) Draw and explain isolated digit recognition system using HMM? [8]
- b) Explain different features used for speech recognition along with their significance. [8]

OR

- Q10)** a) Draw and explain Automatic Speech Recognition (ASR) system? Also explain different performance measures used for ASR system. [8]
- b) Write short note of dynamic time warping. [8]

- Q11)a)** Draw and explain Speaker Verification System? Also explain different performance measures used for speaker verification system. [9]
- b) Explain Text to speech (TTS) conversion system with block schematic? State applications of TTS. [9]

OR

- Q12)a)** Explain different issues and challenges for designing speaker recognition system? State the probable solutions to resolve the issues. [9]
- b) What is speech synthesis? Draw and explain formant speech synthesis method. [9]



Total No. of Questions : 12]

SEAT No. :

P1748

[4859]-103

[Total No. of Pages :3

**B.E. (Electronics & Telecommunications)
c-TELEVISION & VIDEO ENGINEERING
(2008 Pattern) (Elective-III) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) Attempt Q.1 or Q.2,Q3 or Q.4,Q5 or Q.6,Q7 or Q.8,Q9 or Q10,11 or Q12.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.

SECTION-I

- Q1)** a) Write a note on composite video signal [4]
b) Write a note on signal transmission and channel bandwidth. [6]
c) Draw and explain the block diagram of color television system. [6]

OR

- Q2)** a) Draw and explain chromaticity diagram. [4]
b) Draw and explain the block diagram of television transmitter. [6]
c) What is interlaced scanning and why it is used in television system. [6]

- Q3)** a) Compare NTSC, SECAM and PAL television systems. [6]
b) Draw and explain low level transmission in television system. [6]
c) Explain working of NTSC Encoder with suitable diagram . [6]

OR

- Q4)** a) State importance of pattern generator. [6]
b) Explain working of PAL Encoder with suitable diagram. [6]
c) What do understand by resolution or kell factor? How does it affect the vertical resolution of a TV picture? [6]

P.T.O.

- Q5)** a) Give the principle of digital television system. [6]
b) Discuss Digital TV recording techniques. [6]
c) Write a short note on MAC signal. [4]

OR

- Q6)** a) Give the advantages of Digital TV over Analog TV. [6]
b) Explain the principles of Video compression and discuss various video compression formats. [6]
c) Write a short note on MPEG. [4]

SECTION - II

- Q7)** a) Write a note on [12]
Video on demand (VOD)
Conditional access system (CAS)
Direct to home (DTH)
b) Explain 3D stereoscopic techniques. [6]

OR

- Q8)** a) Case study-Live TV coverage plan for a cricket match. [10]
b) Draw and explain set top box with recording facility. [8]
- Q9)** a) What are the features of IPTV, explain the architecture of IPTV. [8]
b) Describe the concept of video transmission in 3G mobile. [8]

OR

- Q10)** a) Define in detail high definition video projector. [8]
b) Discuss in detail video door phones. [8]

- Q11)a)** Compare performance parameters of VCD, DVD, HD-DVD, BD-DVD. **[8]**
- b) Explain acoustical design of an auditorium. **[8]**

OR

- Q12)a)** Write a note on **[8]**

Camcoders

Handycams

- b) Write a note on display devices **[8]**

LED

Plasma.



Total No. of Questions : 12]

SEAT No. :

P1749

[4859]-104

[Total No. of Pages : 3

**B.E. (Electronics & Telecommunications)
d-TEST AND MEASUREMENT SYSTEMS
(2008 Course) (Elective-III) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Draw block diagram of digital data acquisition system and explain the blocks. [8]
- b) Explain the need of calibration. Also explain the calibration standards and traceability [8]

OR

- Q2)** a) In a survey of 15 owners of a certain model of car, the following figures are for avg. petrol consumption were reported. Calculate mean value, median value, standard deviation and the variance. [8]

25.5 30.3 31.1 29.6 32.4 28.9 30.0

33.3 29.5 31.4 33.0 29.2 39.4 31.7

30.5

- b) Define Instrument /Measurement Basics parameters [8]
- i) Sensitivity
 - ii) Resolution
 - iii) Dynamic Range
 - iv) Linearity

P.T.O.

Q3) a) List the specifications of Digital voltmeter (DVM) to be considered while its selection. [8]

b) Explain working principal of LCR-Q meter. Draw diagram & explain in detail. [8]

OR

Q4) a) What is need of RF vector voltmeter? Explain the working with its block diagram. [8]

b) Write short note on [8]

i) Direct current probes

ii) Alternating current probes

Q5) a) Compare Digital Storage Oscilloscope with Analog CRO? Write it's specifications? [10]

b) Explain block diagram & working principles of Digital phosphor oscilloscope. [8]

OR

Q6) a) List and elaborate at least top eight things to consider while selecting DSO? [8]

b) What is need of delay line in High Frequency oscilloscope? Also explain one from delay line. [10]

SECTION - II

Q7) a) Draw a detail block diagram of swept super heterodyne spectrum analyzer and explain its working. Also discuss in detail the block deciding frequency resolution and bandwidth. [8]

b) Explain FFT Analyzer with neat block diagram and list its advantages and limitations. [8]

OR

Q8) a) Elaborate the different trigger capabilities of logic analyzer that differentiate it from other equipments. [8]

b) Compare CRO & logic Analyzer. [8]

Q9) a) Explain frequency synthesis techniques in detail. [8]

b) Write a short note on Digital signal generators. [8]

OR

Q10) a) List and compare different solid state microwave signal sources. [8]

b) Draw a block diagram of virtual instrument with its components and explain. [8]

Q11) a) What are the requirements of the Automatic Test system. [10]

b) List and explain the features of LABVIEW. [8]

OR

Q12) a) Draw a block diagram of virtual instrument with its components and explain. [10]

b) Explain network connection model in detail? [8]



Total No. of Questions : 12]

SEAT No. :

P1750

[4859]-105

[Total No. of Pages :3

B.E. (E&TC)

ARTIFICIAL INTELLIGENCE

(Elective-IV) (2008 Course) (404190) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer papers.*
- 2) *Answer any three questions from each section.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain missionaries and cannibals problems with examples. [8]
- b) Explain the scheme with pseudocode for [8]
- i) Reflex agent with state.
 - ii) Utility based agent.

OR

- Q2)** a) What is Artificial Intelligence? Mention some of the applications that fall within the scope of AI. [8]
- b) Explain the scheme with pseudocode for [8]
- i) Simple reflex agent
 - ii) Goal based agent

- Q3)** a) Explain constraint satisfaction algorithm with its pseudo code [8]
- b) Explain AO* algorithm with its pseudo code. [8]

OR

- Q4)** a) Explain the algorithm for means-ends analysis [8]
- b) Explain the importance and use of plateau, ridge, local maxima and global maxima with respect to hill climbing algorithm. [8]

P.T.O.

- Q5) a)** Explain the concept of forward chaining and backward chaining in the knowledge Representation. [9]
- b) Explain the working of Unification algorithm with suitable example. [9]

OR

- Q6) a)** Compare forward and Backward reasoning. With example explain the Backward reasoning elaborately. [9]
- b) State the rules and steps for converting a given well predicate logic statements to clausal form. [9]

SECTION - II

- Q7) a)** Explain how scripts can be used for knowledge representation. Write a script of setting a drama. [10]
- b) Explain Rote learning and learning by Analogy. [8]

OR

- Q8) a)** Explain in detail the single layer feed forward artificial neural network architecture. [10]
- b) Write a note on Hierarchical planning and least commitment strategy. [8]

- Q9) a)** How waltz's algorithm is applied to propagate symbolic information? Explain the limitations of Waltz algorithm. [8]
- b) Explain the detail architecture of Expert System and explain its component [8]

OR

- Q10) a)** Draw the valid fork labeling, L labeling, T labeling and arrow labeling to label 3-D figures using Waltz's algorithm. [8]
- b) Explain the characteristics of Expert systems and explain the expert systems ELIZA. [8]

Q11)a) Explain in brief various phases of Natural Language Processing (NLP).**[8]**

b) Draw a RTN which can parse a sentence correctly for **[8]**

i) Rambo wanted a new car.

ii) The big boy cut a mango with the black knifr.

OR

Q12)a) What is morphological analysis in Natural Language Processing (NLP).**[8]**

b) Explain the syntactic analysis with suitable example. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1751

[4859]-106

[Total No. of Pages : 2

B.E. (E & TC)

b - AUTOMOTIVE ELECTRONICS

(404190) (2008 Course) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain with neat diagram 4-stroke operation of S.I. Engine. [10]
b) Explain role of stoichiometric ratio (A/F) control in engine efficiency. [8]

OR

- Q2)** a) What is the basic principle of the fuel cell vehicle? [8]
b) Write a short note on following: [10]
i) Battery charging system.
ii) Suspension system of Automotive.

- Q3)** a) Explain Hall effect sensor and its use. [8]
b) Explain the technique used for tyre pressure measurement. [8]

OR

- Q4)** a) Explain typical anticollision system. [8]
b) Explain the role of solenoid in the fuel injection system. [8]

- Q5)** a) Explain cruise control system with sensors used in it. [8]
b) How boost is provided in variable assist steering control system. [8]

OR

P.T.O.

- Q6)** a) Explain airbag system with sensors used in it. [8]
b) Write a short note on following: [8]
i) Traction control system.
ii) Anti-theft system.

SECTION - II

- Q7)** a) Explain any two applications of DSP processor in automotive. [8]
b) Explain how interrupt is mapped in 8 bit. PIC microcontroller. [8]

OR

- Q8)** a) Explain the selection criteria for selecting processor or controller w.r.t. automotive. [8]
b) Draw and explain D.C. Motor Control in Wiper application using PIC microcontroller. [8]

- Q9)** a) Compare and contrast ARM 9, ARM 11 and ARM cortex. [8]
b) Explain any two applications of GPRS system in automotive. [8]

OR

- Q10)**a) Distinguish between CAN, LIN and Flexray. [8]
b) What is Most protocol? Where it used? List advantages of it. [8]

- Q11)**a) Explain step by step sequential diagnostic procedure. [8]
b) Explain future trends in Automotive Electronics. [10]

OR

- Q12)** Explain short note on following: (any three) [18]
a) Multiplex Wiring system of Automotive.
b) Occupant safety feature in modern car.
c) Self Diagnostic system.
d) Effective use of 'C' programming in ECU software development.



Total No. of Questions : 12]

SEAT No. :

P1752

[4859]-107

[Total No. of Pages : 2

B. E. (E&TC)

C-NANOTECHNOLOGY

(2008 Course)(Semester-II) (Elective-IV)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What are the challenges in nanotechnology ? Explain. [8]
b) Comment on 'Quantum Mechanics & Quantum ideas for nanotechnology' [8]

OR

- Q2)** a) Explain "Fundamental Science behind Nanotechnology". [8]
b) Justify the statement 'Bonds are key to nanotechnology'. [8]

- Q3)** a) Justify Silicon Nanocrystal improves the characteristics of Nonvolatile Memories? [8]
b) Explain the effect of electron trapping in Novel dielectric material. [8]

OR

- Q4)** a) What are the problems associated with Nonvolatile Memories ? How nanotechnology plays key role in betterment of performance of these memories? [8]
b) At nano scale what are the problems of dielectric? How Novel Dielectric Materials can help to overcome this problem? [8]

- Q5)** a) Explain different structures of carbon Nanotubes. [10]
b) Discuss useful electrical and mechanical properties of CNT. [8]

OR

- Q6)** a) How CNT is useful for medical applications? [10]
b) Explain the properties of semiconductor and metal nano- particle. [8]

P.T.O.

SECTION-II

- Q7)** a) Explain Fabrication techniques used for MEMS/ NEMS. [8]
b) Explain MEMS devices used in automobile. [8]

OR

- Q8)** a) What do mean by ‘ Nano imprint lithography’ explain it short. [8]
b) What are Nanomachines and Nanodevices, explain them in brief. [8]

- Q9)** a) What is e-beam lithography ? How it is better than other lithography techniques? [8]
b) Write short note on “Nano electronics for advanced computation” [8]

OR

- Q10)**a) Explain advantages and disadvantages of Optical beam lithography over e-beam lithography. [8]
b) How nanotechnology can be used for communication? [8]

- Q11)**a) Explain applications of nanotechnology in optics. [10]
b) Explain applications of nano sensors. [8]

OR

- Q12)** Write short note on (any Three) [18]
a) Soft molecule electronics.
b) Light production and light transmission.
c) Energy capture.
d) Transformation of storage.
e) Nanostructures in electronics.



Total No. of Questions : 12]

SEAT No. :

P1753

[4859]-108

[Total No. of Pages : 3

B. E. (E&TC)

**d-PLC & INDUSTRIAL PROCESS AUTOMATION
(2008 Course) (Semester-II) (Elective-IV)**

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the Sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain with example following types of control systems
i) Regulatory control ii) Servo mechanisms [8]
b) What is P&I diagrams? Explain what information it contains and its use for system engineer. [8]
- OR
- Q2)** a) Draw and explain the block diagram of process control and following terms with example,
i) Process variable
ii) Set point
iii) Measured variable
iv) Manipulated variable. [8]
b) List various types of control systems ? Explain DDC and DCS? Draw block diagram of typical SCADA systems and list components used in SCADA? [8]
- Q3)** a) Why linearization of the sensor is necessary ? Discuss various techniques used for linearization? [8]
b) A temperature between 100°C and 300°C is converted into a 0V to 5V signal. This signal is fed to an 8-bit ADC with a 5V reference.
i) What is the resolution?
ii) What is the actual measurement range of the system?
iii) What hex output results from 169°C?
iv) What temperature does a hex output of C5H represent? [8]

P.T.O.

OR

- Q4)** a) What are various types of pressure transmitters? Explain the DPT with block diagram? List various sensing cells used and explain capacitive cell? Explain how DPT can be used for process tank level measurement? [8]
- b) A measurement of temperature using a sensor that outputs $6.5 \text{ mV}^\circ\text{C}$ must measure to 100°C . A 6-bit ADC with a 10-V reference is used.
- i) Develop a circuit to interface the sensor and the ADC.
- ii) Find the temperature resolution. [8]
- Q5)** a) Explain the integral windup concern to modification of PID algorithm. [4]
- b) Explain different process control loop tuning methods in brief. [8]
- c) Draw the analog circuit for PID mode and explain it. [6]

OR

- Q6)** a) A temperature control system input the controlled variable as a range from 0 to 4 volt. The output is a heater requiring 0 to 8 volt. A PID is to be used with $K_p = 2.4 \% / \%$, $k_i = 9 \% / (\% \cdot \text{min})$, $k_d = 0.7 \% / (\% / \text{min})$. The period of the fastest expected change is estimated to be 8 sec. Develop the PID circuit. [8]
- b) Explain the types of discrete controllers? Explain the various PID implementations with diagram? Discuss the effect of the P, I & D action on system response? [10]

SECTION-II

- Q7)** a) Explain the control valve principle using its basic cross section. [8]
- b) A pressure difference of 1.1 psi occurs across a constriction in a 5-cm-diameter pipe. The constriction constant is $0.009 \text{ m}^3 / \text{s}$ per $\text{kPa}^{1/2}$. Find.
- i) The flow rate in m^3/s ii) The flow velocity in m/s [8]

OR

- Q8)** a) Explain the principle and the various flow control characteristics available for control valves? Draw and explain working of flow control valve with forward and reverse action of pneumatic actuator? What is failsafe? [8]
- b) Explain different control valve types. What is control valve sizing? [8]

- Q9) a)** Explain with examples how the progress in digital control is achieved?[8]
b) What is Fuzzy logic system ? Explain different Fuzzy controllers. [8]

OR

- Q10)a)** Explain ANN based controllers in detail. [8]
b) Explain the Statistical Process Control concern to fuzzy logic system in detail. [8]

- Q11)a)** Draw the ladder diagram for the elevator having following conditions:
i) When the START button is pushed, the platform is driven to the down position.
ii) When the STOP button is pushed , the platform is halted at whatever position it occupies at that time.
iii) When the UP button is pushed , the platform, if it is not in downward motion, is driven to the up position.
iv) When the DOWN button is pushed, the platform, if it is not in upward motion, is driven to the down position. [8]
- b) Explain the various parts of PLC ? Draw the block diagram of I/O cards of PLC? Explain various network topologies used for networking of PLCs? [10]

OR

- Q12)a)** What are operating modes of PLC ? Explain the PLC operating cycle and PLC programming. [8]
b) Draw the ladder diagram for a three motor system having the following conditions: Motor 2(M2) can start 5 seconds after motor 1(M1) starts, when M2 is running , Motor 3(M3) can be started. When M2 is turned off. M3 is off when M1 is turned off, both M2 and M3 stop. [10]



Total No. of Questions : 12]

SEAT No. :

P3167

[Total No. of Pages : 2

[4859]-109

B.E. (E & TC) (Semester - II)

**ADVANCED SATELLITE SYSTEMS AND APPLICATIONS
(2008 Pattern) (Open Elective)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections must be written in separate sheets.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Why is there a need for satellite communication? Explain various advantages and limitations of satellite communication. [8]
- b) Explain following terms : [8]
- i) Apogee and Perigee.
 - ii) Ascending and Descending Nodes.
 - iii) Argument of Perigee.
 - iv) Mean and True anomaly.

OR

- Q2)** a) What is a geostationary orbit? Which conditions should be fulfilled to attain a geostationary orbit? [8]
- b) What are Look angles? Derive an equation for the same. [8]

- Q3)** a) Discuss the design considerations of a communication satellite. [8]
- b) Discuss the TT&C system of a communication satellite. [8]

OR

- Q4)** a) Compare the error probabilities for BPSK and QPSK. [8]
- b) Explain with the help of neat block diagram QPSK transmitter & receiver. Also give the mathematical analysis. [8]

- Q5)** a) Derive the Link-Power Budget equation. [10]
- b) Diagrammatically explain the combined Uplink and Downlink carrier to noise ratio. [8]

P.T.O.

OR

- Q6)** a) Discuss the significance of system noise temperature and G/T ratio in calculation of link budget. [6]
- b) Discuss various sources of interferences between two satellite circuits. Also discuss how it affects link design calculations. [6]
- c) Comment on the following : [6]
- Uplink Budget.
 - Downlink Budget.
 - Overall link Budget.

SECTION - II

- Q7)** a) Explain the principle used in spectrum spreading and dispreading. How is this used to minimize interference in a CDMA system? [10]
- b) With neat block diagram explain DSSS transmitter & receiver with relevant waveforms. [8]

OR

- Q8)** a) Explain the technique of FDMA. How FDMA network is advantageous over TDMA network? [10]
- b) Explain various forms of spread spectrum with relevant waveforms. [8]

- Q9)** a) Explain with neat block diagram critical components of a satellite link. [8]
- b) Compare the error probabilities for BPSK and QPSK. [8]

OR

- Q10)** a) Explain with the help of neat block diagram 16 bit QAM transmitter & receiver. Also give the mathematical analysis. [8]
- b) Write a note on Tracking System. List its characteristics. [8]

- Q11)** a) Explain with neat diagram GPS Position Location principle. [8]
- b) Explain in brief GPS transmitters and receivers. [8]

OR

- Q12)** Write short notes on : [16]
- Differential GPS.
 - Remote sensing.
 - Resource Mapping.
 - VSAT-Earth station.



Total No. of Questions : 12]

SEAT No. :

P1682

[4859]-11

[Total No. of Pages : 2

B.E. (Civil)

c-TQM AND MIS IN CIVIL ENGINEERING

(2008 Course) (Semester-I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the 2 sections separately.*
- 2) *Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 for Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 for Section-II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) Discuss the various barriers which exist in the Indian construction sector which result in a poor quality of construction projects. Suggest measures to improve them. **[10 + 8]**

OR

Q2) Discuss the various barriers which exist in the implementation of TQM programs in construction industry. Suggest measures to overcome them.

[10 + 8]

Q3) Elaborate the 8 principles of the ISO 9001 standards with their applications in the construction organisations of the Government sector. **[16]**

OR

Q4) Differentiate between ISO 9001 and ISO 9004 Quality management system standards and elaborate on how ISO 9004 standards are helpful to the private sector organisations who wish to implement TQM in the construction sector.

[16]

Q5) Discuss with examples, the various principles that are the strengths of any TQM program. **[16]**

OR

P.T.O.

Q6) Differentiate with examples between:

- a) Zero defects and Kaizen. [4]
- b) QA and QC. [4]
- c) TQC and TQM. [4]
- d) Quality Circles and Quality Process. [4]

SECTION-II

Q7) Discuss advantages of using MIS in the construction projects executed through contracting in the Government Sector. [16]

OR

Q8) Discuss the pre-requisites necessary for the successful implementation of MIS in any construction organisation. [16]

Q9) Discuss the interfaces necessary between the company policies, strategic objectives, operational constraints and database management systems for the successful implementation of MIS systems in an organisation which is an MNC working on multistoreyed constructions. [18]

OR

Q10) Elaborate the various modules available in the ERP or SAP systems and explain with examples, how these modules can manage construction projects performance in the real time. [18]

Q11) Discuss applications of:

- a) Decision Support Systems. [4]
- b) Data acquisition systems. [4]
- c) Data handling and converting systems. [4]
- d) Reporting systems. [4]

OR

Q12) Elaborate on:

- a) Cloud computing techniques. [4]
- b) Mobile based MIS applications. [4]
- c) Data encoding and decoding techniques. [4]
- d) Network security. [4]



Total No. of Questions : 12]

SEAT No. :

P3535

[Total No. of Pages : 3

[4859] - 110

B.E. (E & TC)

Advanced Trends in Telecommunication

(Open Elective)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With neat block diagram, explain the working of ad-hoc/sensor networks. **[8]**

b) List out advantages of ad-hoc networks. What are unique constraints and challenges in adopting ad-hoc/sensor networks. **[10]**

OR

Q2) a) Classify MAC protocols. With neat frame format, explain each field in media access control protocols. **[10]**

b) Explain with example explain the algorithm of routing protocol used in adhoc networks. **[8]**

Q3) a) What is the role of RFID in IoT. List applications of IoT. **[8]**

b) With the help of network elements, describe the working operation of ubiquitous computing. **[8]**

OR

Q4) a) With neat diagram, brief network resources and physical devices in IoT. **[8]**

b) What is meant by Interoperability in IoT? List out standards of IoT. **[8]**

P.T.O.

- Q5)** a) Explain Smart Grid concept in smart city with neat diagram. [8]
b) With neat diagram, explain substation and feeder monitoring system. [8]

OR

- Q6)** a) Describe with block diagram, the working principle of Intelligent housing. [8]
b) What is meant by energy measurements? Brief the process of life cycle efficient production method. [8]

SECTION - II

- Q7)** a) Explain the working principle of hetrodyne architecture of SDR. [10]
b) With neat diagram and mathematical expression, brief multi channel modulation. [8]

OR

- Q8)** a) Explain in brief and diagram following terms: [8]
i) Spectrum sensing.
ii) Spectrum management.
b) With block diagram, explain the working of cognitive radio networks. [10]

- Q9)** a) Describe the working of MIMO system with neat diagram in co-operative network. [8]
b) List out benefits and draw backs and applications of co-operative network. [8]

OR

- Q10)** a) With neat diagram, explain the working principle of cooperative communication network. [8]
b) Describe the working method of smart antennas in cooperative networks. [8]

Q11) a) List out various regulatory and safety aspects of Tele-health care system. **[8]**

b) Explain the working principle of co-operative communications for Tele-health. **[8]**

OR

Q12) Write a short notes on:

a) Flexible spectrum usage for Tele-health care. **[8]**

b) Reliability and privacy aspects of Tele-health care system. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1754

[4859]-112

[Total No. of Pages : 3

B.E. (Electronics)

ELECTRONICS SYSTEM DESIGN

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer three questions from section I and three questions from section II.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Figures to the right indicate full marks.*
- 4) Neat diagrams must be drawn wherever necessary.*
- 5) Use of pocket calculator is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss in detail the different stages of an electronic product development. Explain the implications of skipping a particular stage in development. **[10]**
- b) Explain the pilot production batch. Why it is important in electronic product design. **[8]**

OR

- Q2)** a) A communication system is to be designed to work at RF range. Discuss the considerations in design as far as reliability of the system is concerned. **[10]**
- b) Define and explain the following terms in mathematical way. **[8]**
- i) MTBF
 - ii) MTTF
 - iii) Failure Rate
 - iv) Reliability

P.T.O.

- Q3)** a) Explain Instrumentation amplifier with proper circuit diagram. Explain its need in analog signal conditioning. [8]
- b) Explain any one application of data acquisition system using MAX 11046 which consist high performance, multichannel simultaneous sampling ADC's. [8]

OR

- Q4)** a) List different ADC's specifications and write their importance in design point of view. [8]
- b) Explain error budget analysis with one example of an electronic product. [8]
- Q5)** a) Determine the hardware design considerations for a load based weighing machine to display weight, rate and price information on digital display. [8]
- b) Design and explain four channel temperature scanner using AD7817 with any microcontroller. [8]

OR

- Q6)** a) What are the factors affecting on selection of buses and protocols in high speed electronic product. [8]
- b) Draw the typical wiring diagram of each interface RS-485, RS-422, RS-432 and I2C. Also state that how many devices can interface with these buses. [8]

SECTION - II

- Q7)** a) Explain different phases of software design. List the common bugs and how to overcome these bugs? [10]
- b) With the help of suitable example explain in detail how waterfall model is used for software development. [8]

OR

- Q8)** Write short notes on: [18]
- a) Structured Programming.
- b) Real time software.
- c) Steps in programming steps in assembly code on PC.
- d) Choice between assembly and high level language.

- Q9) a)** What are the different PCB Design issues for high speed integrated circuits. Explain in detail. [8]
- b) Write a note on shielding and guarding. [8]

OR

- Q10)a)** Explain different termination schemes for avoiding reflections in high speed PCB design. [8]
- b) Find the characteristic impedance of Strip line geometry when the PCB laminate thickness is 1.6 mm and relative permittivity is 4.2. The width of embedded track is 1.2mm and thickness 35 micron. [8]

- Q11)a)** Explain electromagnetic compatibility? Why it is necessary? [8]
- b) Why environmental testing is necessary? How it is carried out? [8]

OR

- Q12)a)** Explain how debugging of electronics circuit is carried out by logic analyzer. [8]
- b) Explain following equipment for circuit testing: [8]
- i) Digital storage oscilloscope.
 - ii) Mixed signal oscilloscope.



Total No. of Questions : 12]

SEAT No. :

P1755

[4859]-113

[Total No. of Pages : 3

**B.E. (Electronics Engineering)
VLSI DESIGN
(2008 Course) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steams tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain CMOS inverter and its transfer characteristics in detail. How to achieve symmetry in these characteristics. [8]
- b) Design 4:1 Mux using transmission Gates. Compare it with conventional methods. [8]

OR

- Q2)** a) Explain the followings: [8]
- i) Hot electron effect
 - ii) Body effect
- b) Explain the static & dynamic power dissipation. Derive an expression for power delay product. [8]
- Q3)** a) Explain DRAM in detail with suitable diagram. [8]
- b) Give the classification of memory with the application in each case. [8]

OR

P.T.O.

- Q4)** a) Differentiate between SRAM & DRAM technologies. [8]
b) Explain read/write operation of 6T SRAM cell with the help of timing diagrams. [8]

- Q5)** a) Explain different modeling styles in VHDL coding with examples. [9]
b) Compare VHDL [9]
i) Variables and Signals.
ii) Synthesizable and Non-synthesizable statements.

OR

- Q6)** a) Differentiate Moore and Mealy machine with suitable examples. [9]
b) Write a VHDL code for a JK FF. Also write a test bench for it. [9]

SECTION - II

- Q7)** a) Draw block diagram of CPLD and List its Specifications. [8]
b) Differentiate between FPGA & CPLD. [8]

OR

Q8) Explain:

- a) Antifuse [5]
b) CLB [6]
c) Specification of FPGA [5]

- Q9)** a) Explain with Block Diagram of Full & Partial Scan. [10]
b) Explain stuck at fault model. [8]

OR

Q10) Write Short Notes on: [18]

- a) DFT
b) JTAG
c) BIST
d) TAP Controller

Q11)a) Explain Global and Switch box routing. [8]

b) Explain off chip connection and I/O Architecture. [8]

OR

Q12) Write short notes on the following: [16]

a) Power distribution and optimization.

b) Two Phase clocking and clock distribution.



Total No. of Questions : 12]

SEAT No. :

P1756

[4859]-114

[Total No. of Pages : 2

B.E. (Electronics)

EMBEDDED SYSTEMS

(Semester - I) (404203) (2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are various software architectures used in embedded system design? [12]
- b) Describe the pico-net & scatter-net concept used in blue tooth protocol. [6]

OR

- Q2)** a) What are various design metrics used in embedded system design?[12]
- b) Describe the topologies supported in Zigbee protocol. [6]

- Q3)** a) What are the processor and memory selection criteria used in embedded system design? [10]
- b) What are the various reasons for occurrence of interrupt latency? [6]

OR

- Q4)** a) What are four major design rules used for RISC Processor? [10]
- b) Describe how interrupt latency can be minimized? [6]

- Q5)** a) With the help of data flow model of ARM processor, describe the load and store operation performed by the processor? [10]
- b) Compare ARM mode with Thumb mode. [6]

OR

P.T.O.

- Q6)** a) Describe Register banking concept used in ARM processor? [10]
b) Describe the role of SPSR & CPSR in ARM processor. [6]

SECTION - II

- Q7)** a) LPC 2148 is most suitable processor for protocol converter applications. Explain why? [6]
b) Draw the interfacing diagram to interface 8×8 keyboard matrix to LPC 2148 Processor. Also write C code for this interface? [10]

OR

- Q8)** a) Describe on chip ADC interface of LPC 2148. Also write C code for ADC operation? [8]
b) Describe on chip PWM interface of LPC 2148. Also write C code for PWM operation? [8]

- Q9)** a) Traditional OS is not suitable for embedded system design. Explain why? [8]
b) Describe state diagram of “ μ COS-II”. [8]

OR

- Q10)** a) What features of “ μ COS-II” makes it suitable for embedded system applications? [6]
b) Describe various scheduling algorithms used in embedded system design. [10]

- Q11)** a) What are the techniques used in RTOS to handle inter task communication? [12]
b) What are the techniques used in RTOS for the generation of the delay?[6]

OR

- Q12)** a) What are the reasons for priority inversion? How this problem can be solved? [8]
b) Describe Cruise control system as an application of embedded system? [10]



Total No. of Questions : 12]

SEAT No. :

P3168

[Total No. of Pages : 2

[4859]-115

B.E. (Electronics)

ADVANCED MEASUREMENT SYSTEMS

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Both sections should be written separately.*

SECTION - I

- Q1)** a) What are the signal integrity testing challenges and possible solutions?[8]
b) Explain arbitrary waveform generator in detail. [8]

OR

- Q2)** a) State and explain electrical validation and debug with DPO. [8]
b) Explain in detail signal integrity design issues. [8]

- Q3)** a) Explain architecture, operation and use of logic analyzer. [8]
b) Explain hardware design and testing methods of spectrum analyzer. [8]

OR

- Q4)** a) Explain architecture, operation and use of Network analyzer. [8]
b) Explain DSO trigger modes. What is the use & limitations different types of Analysis. [8]

- Q5)** a) Explain embedded communication using Ethernet. [8]
b) What are the design issues and the role of electronic measurements for debugging in automotive electronics? [4]
c) What are the different interfacing techniques? Explain interfacing of graphic LCD (320×240) display. [6]

OR

P.T.O.

- Q6)** Write short notes on the following : **[18]**
- a) GSM Modem.
 - b) Embedded communication using RF Modules.
 - c) Interfacing of touch screen.

SECTION - II

- Q7)** a) What are the barraters? Explain the operation of direct reading barraters bridges. **[8]**
- b) Explain in detail measurement of VSWR. **[8]**

OR

- Q8)** a) Explain transmission cavity & reactor wave meter. **[8]**
- b) What is attenuation? Explain measurement of free space attenuation. **[8]**

- Q9)** a) Explain VISA (GPIB, VXI, PXI) and SCPI coding. **[8]**
- b) Explain role of software & Hardware in virtual instrumentation. **[8]**

OR

- Q10)** a) Explain FDM and ASK Modulation techniques in virtual instrumentation. **[8]**
- b) Explain application of modulation techniques in Distortion Analyzer. **[8]**

- Q11)** a) Explain different modes of Universal counter. **[6]**
- b) Explain automation in digital instruments. **[6]**
- c) Explain DAC techniques in detail. **[6]**

OR

- Q12)** Write short note on any three : **[18]**
- a) Sample and hold.
 - b) ADC techniques in digital instrumentation.
 - c) V to F converter.
 - d) Data Loggers.



Total No. of Questions : 12]

SEAT No. :

P1757

[4859]-116

[Total No. of Pages : 3

B.E. (Electronics)

b : ADVANCED POWER ELECTRONICS

(2008 Course) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.no. 1 or 2; Q.no. 3 or 4; Q.no. 5 or 6 from section - I and Q.no. 7 or 8; Q.no. 9 or 10; Q.no. 11 or 12 from section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams and waveforms must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, mollier charts, electronic packet calculator and stream tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is the need of series converter? Explain with neat circuit diagram and waveforms, working of single phase series full converter for level load. [10]

b) For the above converter, derive an expression for input power factor. [8]

OR

Q2) a) What is the need of converter in industry. Explain with neat circuit diagram and waveforms, working of 3 phase IGBT based PWM rectifier. Comment on Power Factor. [10]

b) Explain the need of Twelve-Pulse converter in industrial application. [8]

Q3) a) With the help of neat block diagram, explain PLL control of DC drives and state its advantages. [8]

b) Explain with neat block diagram Microcontroller based DC drives. [8]

OR

P.T.O.

- Q4)** Write a short note on any two: [16]
- a) Direct vector control of Induction Motor.
 - b) Flux vector control of Induction Motor.
 - c) Sensor less vector control of Induction Motor.
 - d) Adaptive control of Induction Motor.

- Q5)** a) With the help of neat circuit diagram and associated waveforms, explain the operation of Diode-Clamped multilevel inverter and state its features, advantages and disadvantages. [12]
- b) With the help of neat circuit, explain the operation of variable dc-link inverter. [4]

OR

- Q6)** a) With the help of neat circuit diagram and associated waveforms, explain the operation of Cascaded multilevel inverter and state its features, advantages and disadvantages. [12]
- b) What are the techniques of advanced modulation? Explain staircase modulation. [4]

SECTION - II

- Q7)** a) What are Z-Source inverters/compare with VSI and CSI. [6]
- b) With the help of neat circuit diagram, relevant waveforms and mode equivalent circuits, explain the operation of a ZVS resonant DC-DC converter. [10]

OR

- Q8)** a) What are low drop out Regulators? Explain. [8]
- b) What are Bi-Directional Power Supplies? Explain. [8]

- Q9)** a) What is role of Power Electronics in renewable energy? Explain with neat circuit diagram variable wind energy conservation system. [10]
- b) What is Traction drives? Explain semiconductor converter controlled Traction drives and states its advantages. [8]

OR

Q10) Write a short note on any two: **[18]**

- a) Solar battery powered drives.
- b) Battery charger.
- c) Photo voltaic energy conservation system.
- d) Energy conservation in electrical drives.

Q11)a) What is the need of energy audit? Explain in brief. **[8]**

- b) Define the term voltage sag. Explain different sources of sags and interrupts. **[8]**

OR

Q12)a) Explain probable preventative solutions to control the factors contributing the power quality distortions. **[8]**

- b) What is FACTS (Flexible AC transmission)? Explain. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1758

[4859]-117

[Total No. of Pages : 3

B.E. (Electronics)

c - BIOMEDICAL INSTRUMENTATION

(2008 Course) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Write short note on active and passive transducer used for measurement of bio-signal. [8]
- b) Explain with suitable diagram action potential, resting potential, depolarization and re-polarization of a cell. [8]

OR

- Q2)** a) Give full form of: EKG, EMG, EOG, ERG, EEG and EGG. [6]
- b) Discuss 10 most important factors to be considered in the design of medical instrumentation. [10]

- Q3)** a) Explain in detail working of brain & function of spinal chord. [8]
- b) What is EEG? Draw block schematic of EEG and explain in detail. [8]

OR

- Q4)** a) Name different types of EMG. Explain the procedure to perform EMG with the help of diagram. [8]
- b) Define α, β, δ and θ activities. [8]

P.T.O.

- Q5)** a) Sketch bipolar limb leads, unipolar augmented limb leads and comment. [8]
- b) Explain an electro conduction system of the heart. [6]
- c) The distance between two consecutive R waves is 30 mm and paper speed is 60mm/sec what is heart rate and comment on heart rate. [4]

OR

- Q6)** a) What are the effect of artifacts on ECG recording? Draw and explain a block diagram of ECG machine. [10]
- b) Explain the concept of phonocardiography with the help of basic heart sound and primary signal characteristic. [8]

SECTION - II

- Q7)** a) Explain Finger Plethysmography, Echocardiography, and Defibrillator. [12]
- b) Explain the necessity and functioning of pace marker. [4]

OR

- Q8)** a) Write a short note on electromagnetic blood flow meter. [6]
- b) Explain in details patient monitoring system. [10]

- Q9)** a) Name different methods of blood cell counting. Explain coulter counters in detail. [8]
- b) Explain in brief dialysis system. [8]

OR

- Q10)**a) What is pH of blood? Explain electrode used in blood pH measurement. [8]
- b) Describe the working of Flame photometer. [8]

Q11)a) What are the properties of X-Ray machines? With block schematic explain operation of X-ray machine. [10]

b) Explain merits and demerits of MRI system. [8]

OR

Q12) Write a short note on (any 3): [18]

a) Laser in vision correction.

b) Ultrasonic Doppler machine.

c) Shadow less light.

d) Amalgamator.



Total No. of Questions : 12]

SEAT No. :

P3915

[Total No. of Pages : 2

[4859] - 117A

B.E. (Electronics) (Semester - I)

MECHATRONICS

(2008 Pattern) (Elective - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer questions 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define Mechatronics. Explain the role of Mechatronics in design of elevator system. **[10]**
- b) What are the functions of Mechatronics System? Explain the key elements of Mechatronics in detail. **[8]**

OR

- Q2)** a) Explain the term static characteristics and dynamic characteristics. Explain the terms: **[10]**
- i) Speed of response
 - ii) Fidelity
 - iii) Measuring lag
- b) State different types of gears. Explain any two types of gears with their applications. **[8]**

- Q3)** a) Define the term pressure. Explain in detail LVDT for pressure measurement. **[8]**
- b) What is a model? Explain Elastic system modelling in detail. **[8]**

OR

- Q4)** a) Write a short note on proximity sensors. **[8]**
- b) Explain position measurement system using ultrasonic method. **[8]**

P.T.O.

- Q5)** a) What are the important specifications of ADC and DAC? Explain in detail. [8]
b) Define the term PLC. List the different specifications of PLC. Which different input and outputs used in PLC? [8]

OR

- Q6)** a) Write a short note on Pulse width Modulation and Programmable electro hydraulic valves. [8]
b) Explain drive system load calculation and VFD in detail. [8]

SECTION - II

- Q7)** a) Explain in detail the design of a mobile robot. [8]
b) Write a short note on HART Protocol. [8]

OR

- Q8)** a) With the help of suitable diagram explain principle and working of magnetic recorder. [8]
b) Explain RS 232 standard in detail. [8]

- Q9)** a) Explain the operation of CNC machine with the help of neat block diagram. [8]
b) Explain UART in detail. [8]

OR

- Q10)**a) Describe General Purpose Interface Bus standard. [8]
b) Write short note on RS-422 and RS-485 interfaces. [8]

- Q11)**a) Explain a data logger for a milk filling plant having conveyer based filling and sealing system. [10]
b) Write short note on signal conditioning and signal conversion. [8]

OR

- Q12)**a) Discuss working of copying machine with block diagram. [10]
b) Explain multichannel data logger with block diagram. [8]



Total No. of Questions : 12]

SEAT No. :

P1759

[4859]-118

[Total No. of Pages : 3

B.E. (Electronics)

a - ADVANCED COMPUTER ARCHITECTURE

(2008 Pattern) (Semester - I) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are the performance metrics and measures used for parallel computers? Explain. [8]
- b) Why do we need high speed computing? Explain von-newman computer architecture. [8]
- c) Explain instruction level parallelism. [2]

OR

- Q2)** a) Explain in brief Feng's classification and Handler's classification for parallel computer architectures. [8]
- b) State various applications of parallel processing. Explain the application of parallel processing in weather forecasting. [8]
- c) What is cluster computing? [2]

- Q3)** a) What do you mean by EPIC? State and explain features of EPIC. [8]
- b) Explain the following terms w.r.t. pipeline processor. [8]
- i) Data buffering
 - ii) Job sequencing
 - iii) Collision prevention
 - iv) Internal Forwarding

OR

P.T.O.

- Q4)** a) Compare superscalar & VLIW processor. [8]
b) What are different pipelining Hazards? How can these hazards be detected and resolved. [8]

- Q5)** a) Explain pipeline chaining with example. [8]
b) Explain: [8]
i) Vector loops
ii) Any two vector optimizing Functions

OR

- Q6)** a) Explain bottlenecks of vector processing. [8]
b) Draw and explain computation section of Cray - I vector processor. [8]

SECTION - II

- Q7)** a) Discuss in detail static and dynamic topologies used in interconnection network. [8]
b) What is inter PE communication? Explain network design decisions for inter PE communications. [10]

OR

- Q8)** a) Write and explain a parallel algorithm for array processor to compute FFT? [8]
b) Explain cube interconnection network and hyper cube interconnection network. [10]

- Q9)** a) Explain in brief: [8]
i) Loosely coupled multiprocessors.
ii) Tightly coupled multiprocessors.
b) What is memory contention? Explain the arbitration techniques to resolve the issue of contention. [8]

OR

- Q10)a)** Write short note on inter process communication & synchronization. **[8]**
- b) Explain in brief desirable processor characteristics for multiprocessor architecture. **[8]**

- Q11)a)** Explain in brief latency hiding techniques. **[8]**
- b) Explain synchronous & asynchronous message passing in parallel programming. **[8]**

OR

- Q12)a)** Explain use of following primitives w.r.t. parallel programming. **[8]**
- i) Send ();
 - ii) Receive ();
 - iii) Fork ();
 - iv) Join ();
- b) What are the issues involved in multithreaded architecture? Explain. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1760

[4859]-119

[Total No. of Pages : 3

B.E. (Electronics & Engineering)

b : ENTREPRENEURSHIP & BUSINESS PLANNING

(Elective - II) (2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer 3 questions from Section - I and 3 questions from Section - II.*
- 2) Answers of the two sections should be written in separate answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is entrepreneurship? State advantage & disadvantages of entrepreneurship. **[8]**

b) What are six steps in problem solving process? **[8]**

OR

Q2) a) Explain different kinds of entrepreneurial business. **[8]**

b) State financial & non-financial goals of Entrepreneur. **[8]**

Q3) a) Explain Demand supply curve in market economy? **[6]**

b) What are some of the advantages and disadvantages of entering family business. **[6]**

c) State advantages and disadvantages of starting your own business. **[6]**

OR

Q4) a) Explain business activities in market economy & comment on "Concept of Cost". **[9]**

b) State Advantages & Disadvantages of buying an Existing Business. **[9]**

P.T.O.

- Q5)** a) How can Entrepreneurs with social business ideas get the financing they need to start and run a business? [8]
- b) Explain briefly types of loans. State some reason a bank may reject loan application. [8]

OR

- Q6)** a) What is a Business plan? State the importance of a Business Plan? [8]
- b) Explain five steps of primary market research. [8]

SECTION - II

- Q7)** a) State advantages and disadvantages of computerized record keeping. [8]
- b) Specify six ways you can Recruit employees. [4]
- c) Specify any six leadership characteristics. [4]

OR

- Q8)** a) State advantages and disadvantages of computerized record keeping. [8]
- b) What are four main parts of an income statement? [4]
- c) How can you motivate employees. [4]

- Q9)** a) Explain services provided by financial experts. [8]
- b) Enlist and explain briefly technological items that might be used in business. [8]

OR

- Q10)** a) What is mean by break even analysis. Explain with suitable graph. [8]
- b) What are the advantages of e-mail & www in business? [8]

Q11)a) Explain in what way laws protect the business and project the business and Protect consumers? [6]

b) Short note on Business Ethics. [6]

c) What are the risks and benefits of competing globally. [6]

OR

Q12)a) What are different responsibilities of Entrepreneurs? [6]

b) Explain the strategy for growth of business. [6]

c) What are global trends for business? [6]



Total No. of Questions : 12]

SEAT No. :

P3160

[Total No. of Pages : 4

[4859] - 12

B.E. (Civil)

Earthquake Engineering

(Elective - II) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) From Section - I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from Section - II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Figures in bold to the right, indicate full marks.
- 4) IS 456, IS 1893, IS 13920 are allowed in the examination.
- 5) Neat diagrams should be drawn wherever necessary.
- 6) If necessary, assume suitable data and indicate clearly.
- 7) Use of electronic pocket calculator is allowed.

SECTION - I

- Q1)** a) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. [8]
- b) Explain the Plate Tectonic theory. [8]

OR

- Q2)** a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure. [8]
- b) What are the learning from past earthquakes? Explain design philosophy behind earthquake resistant design of structures. [8]

- Q3)** a) Obtain the response for a SDOF system subjected to forced but un-damped vibration. [8]
- b) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6$ kg/cm² & $EI = 10,000$ kN.m². [8]

OR

P.T.O.

- Q4) a)** Draw the mathematical model for the structure shown in Fig. 4.1 and obtain governing equation of motion. Assume $m = 2000\text{kg}$. [8]

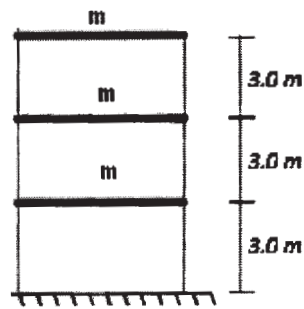


Fig.4.1

- b) A cantilever beam AB of length 'L' carries a mass 'M' as shown in figure 4.2. Write the equation of motion and find the expression for the frequency of motion. [8]



Fig.4.2

- Q5) a)** Explain R.C.C. shear walls with neat sketches. [9]
b) Explain the various factors used in seismic coefficient method. [9]

OR

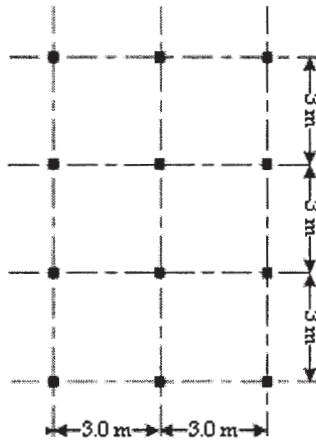
- Q6)** A symmetrical three storey RC school building located in Zone V with following data : [18]

- Plan Dimensions = $7\text{m} \times 7\text{m}$.
- Storey Height = 3.5 m .
- Total weight of beams/storey = 130kN .
- Total weight of columns/storey = 50kN .
- Total weight of walls/storey = 530 kN .
- Live load = 130 kN .
- Weight of terrace floor = 655 kN .

Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

SECTION - II

Q7) A G+2 building is located in seismic zone III. The floor-to-floor height is 3.10 m. The building is supported on Type-II strata. The R.C. frames are in-filled with brick walls. The lumped weight due to dead loads is 5kN/m^2 on floors and 2.5kN/m^2 on the roof. The floor slabs are designed for a live load of 2.5kN/m^2 and the roof is designed 1.5kN/m^2 . Calculate the base shear and distribute along the floors along X-direction. [16]



OR

Q8) a) What is liquefaction of soil? Describe the remedial measures for reducing liquefaction of soils. [8]

b) Explain static analysis and dynamic analysis for structures. [8]

Q9) What is Seismic Isolation? Discuss in details with the sketches, the concept of Active and Passive control systems? [16]

OR

Q10) Explain the various techniques of retrofitting and rehabilitation of structures. [16]

Q11) A (250 X 500) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 350 kN and a moment of 35 kNm. The SBC of the soil is 164 kN/m². Use M20 grade of concrete and steel of grade Fe 415 and design the footing. **[18]**

OR

Q12) Write notes on following with neat sketches (Any Three): **[18]**

- a) Load Resisting systems.
- b) Response Spectrum Analysis.
- c) Eccentrically Braced Frames.
- d) Ductile Detailing of Beam-Column Joints.
- e) Tuned Mass Dampers.



Total No. of Questions : 12]

P4432

SEAT No. :

[Total No. of Pages : 2

[4859] - 121

B.E. (Electronics)

ROBOTICS AND AUTOMATION (Elective - II(d))

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Draw neat diagrams wherever necessary.*
- 2) *Write side figures indicate marks.*
- 3) *Solve Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6 from Section- I.*
- 4) *Solve Q7 or Q8, Q.9 or Q.10, Q.11 or Q.12 from Section-II.*
- 5) *Assume data necessary.*

SECTION - I

Q1) a) Explain the concept of robotics? How the classification of robotics carried out? [8]

b) Draw and explain general structure of robotic mechanical systems? [8]

OR

Q2) a) Explain the various components in robotics subsystem? [8]

b) What are the commercially available software packages for robot simulation? Explain any one application in brief? [8]

Q3) a) Explain dynamic modeling of robotic manipulators - force and torque balance on an isolated link? [10]

b) What is Kinematics and Inverse Kinematics? Explain it in robotics applications? [6]

OR

Q4) a) Explain the terms

i) Degree of freedom

ii) Workspace

iii) Kinematics

iv) Dynamics in regards with robotic systems? [8]

b) Write in brief about analytical approaches for reduction of Inverse Kinematics? [8]

Q5) a) What are the popular mechanisms in robotics? Explain four bar mechanism? [9]

b) What are actuators? What is role of actuators in robotics? How they are classified? Explain in brief electromagnetic actuator? [9]

P.T.O.

OR

- Q6)** a) What are encoders? How they are classified? How they are used in robotics systems? Explain linear and rotary encoders? [9]
b) Explain sensor mounting arrangement in robotics systems? Explain it with computer interface/circuitry? [9]

SECTION - II

- Q7)** a) Explain the role of fuzzy controller in robotics applications? [8]
b) Explain On-off trajectory, relocking and acceleration profile in robotics applications [8]

OR

- Q8)** a) Explain steps the trajectory planning to avoid the obstacle in the path?[8]
b) What is error budgeting in the robotics applications. [8]

- Q9)** a) Explain hardware considerations for robotic vision systems? [8]
b) Write in brief design methodology for robotic vision systems? [8]

OR

- Q10)**a) Explain the applications of robotics vision systems? [8]
b) Explain in short video analytics in robotic vision systems [8]

- Q11)**a) Explain Structure of Automatic Industrial Systems [9]
b) Explain welding automation? [9]

OR

- Q12)**a) How kinematics and control of automatic machines is carried out? [9]
b) Explain the relationship between the robot intelligence and the product, productivity of a manufacturing process [9]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

P1761

[4859]-123

**B.E. (Electronics)
PROCESS AUTOMATION
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain the following control system evaluation criteria. **[6]**
- i) Minimum area
 - ii) Quarter amplitude
- b)** Explain process control principles with: **[10]**
- i) A self regulating Process.
 - ii) Human Aided control
 - iii) Automatic Control

OR

- Q2) a)** Explain with suitable example following process characteristics: **[8]**
- i) Process Equation
 - ii) Process Load
 - iii) Process lag
 - iv) Self Regulation
- b)** What are the different categories of signal? Which signal is widely Used in process Industry? Write standard ranges of signals. **[8]**

P.T.O.

- Q3)** a) Draw schematics diagram of a PI and PD controller using OPAMPs and explain. [8]
- b) For a proportional controller the controlled variable is a process temperature with a range of 50°C to 130°C and a set point of 73.5°C. Under nominal condition the set point is maintained with an output of 50%. Find the proportional offset that results from a load change which requires a 55% output if the proportional gain is: [10]
- i) 0.1
 - ii) 0.7
 - iii) 2.0
 - iv) 5.0

OR

- Q4)** a) Write down the comparisons of electronic, pneumatic and hydraulic control systems. [8]
- b) Explain the following discontinuous controller modes: [10]
- i) Two Position
 - ii) Three Position.
 - iii) Single speed floating control
 - iv) Multiple speed floating control

Q5) What is control valve noise? How it affects performance of control valve?[16]

- a) Write sources of valve noise
- b) Write a note on valve positioner.

OR

Q6) Explain in details following (any three): [16]

- a) Cavitation and flashing
- b) Pneumatic controller
- c) Hydraulic controller
- d) Valve Sizing

SECTION - II

- Q7)** a) Explain feed forward control system with suitable example. [8]
b) Explain the concept of Model Predictive Control [MPC]. [8]

OR

- Q8)** a) What is ratio control system? Explain direct approach to ratio control with block diagram. [8]
b) Why adaptive controllers are needed? Explain programmed adaptive control. [8]

- Q9)** a) Why robotics is need in process industry explain with example? [8]
b) Explain the instrumentation scheme for air compressor. [10]

OR

- Q10)**a) Explain feed forward control for the composition of overhead and bottoms product in a distillation column. [10]
b) Explain the classification of industrial robots. List various applications of robots. [8]

- Q11)**a) Explain different recorders used in process instrumentation. [8]
b) Draw the block diagram of a SCADA and explain the function of each blocks. [8]

OR

- Q12)**a) Write a short notes on: [10]
i) Direct Digital Control System.
ii) Supervisory Control System.
b) Explain the role of Control Panels in Process automation. [6]



Total No. of Questions : 12]

SEAT No. :

P1762

[4859]-124

[Total No. of Pages : 3

B.E. (Electronics)

**a - AUDIO AND VIDEO ENGINEERING
(2008 Pattern) (Elective - III) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Use of electronic pocket calculator is allowed.*
- 5) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the working of precision-in-line picture tube. Describe the constructional, functional & beam technique employed in the precision-in-line tube. **[8]**
- b) Justify the choice of 625 lines for TV transmission. Why is the total number of lines kept odd in all television systems? What is the significance of choosing the number of lines as 625 and only? **[6]**
- c) Distinguish between progressive and interlaced scanning and explain various application areas of both. **[4]**

OR

- Q2)** a) Explain the working of television camera with neat diagram and explain how optical image is converted to electrical signal using camera. **[6]**
- b) Sketch a well label diagram of composite video signal and explain it in detail. **[8]**
- c) Explain in short the chromaticity diagram and give brief about mixing of colours in television. **[4]**

P.T.O.

- Q3)** a) Draw the block diagram of a PAL colour TV transmitter and receiver and describe how does of produce R, G and B signals. [8]
- b) Explain with the help of block schematic the facilities provided in a dubblescope & explain its use in alignment of RF tuner, video IF amplifier & Ground IF amplifier. [8]

OR

- Q4)** a) Explain with block schematic operation of NTSC colour Receiver. [8]
- b) Compare PAL, NTSC and SECAM TV system. [4]
- c) Explain why (G-Y) is not transmitted in colour TV transmission. [4]

- Q5)** a) With suitable diagram explain the MAC encoder and decoder & its formats. [8]
- b) Compare the analog TV with DTV & HDTV. [8]

OR

- Q6)** a) Draw and explain functional block diagram of digital colour TV. [8]
- b) What are the objectives of MPEG-2 standard? What do you understand by the term bit stream scalability? How does layered coding approach improve the quality of picture while offering flexibility. [8]

SECTION - II

- Q7)** a) Explain in short: [8]
- i) Video on Demand.
- ii) CATV.
- b) Discuss a live TV coverage plan for a cricket match. Show the camera placement at different locations & other equipment set-up for live broadcast. [10]

OR

- Q8)** a) With suitable block diagram explain CCTV system. State the applications of CCTV. [6]
- b) Explain the direct-to-home (DTH) technique for TV broad casting using neat block diagram. [6]
- c) Draw a neat block diagram of HDTV decoder and explain function of each block. [6]

- Q9) a)** Explain the different DVD formats. [8]
- b) Explain the principle of magnetic recording and reproduction with a neat diagram. What is the relationship between gap-width, tape-speed and frequency of audio signal. [8]

OR

- Q10)a)** Explain why performance of DVD is superior to other mediums. [8]
- b) Enlist and explain the audio compression ITU-T standards. [8]

- Q11)a)** Define the following terms: [8]
- i) Reverberation.
 - ii) Absorption coefficient.
 - iii) Accoustics chamber.
 - iv) Sound reduction index (SRI).
- b) Explain with neat block diagram how digital satellite radio (DSR) receiver works. [8]

OR

- Q12)a)** Explain the working of a typical chordless microphone PA system. State the type of microphone used & their specifications. [8]
- b) Write short note on: [8]
- i) Special type of speakers.
 - ii) Hi-Fi system.



Total No. of Questions : 12]

SEAT No. :

P1763

[4859]-125

[Total No. of Pages :3

B.E. (Electronics)

b-IMAGE PROCESSING AND MACHINE VISION

(2008 Course) (Elective-III) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three Questions from section one and three Questions from section two.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** How digital image is generated from analog image? Explain fundamental steps in digital image processing with the help of diagram? **[10]**
- b) What are the basic relationship between the pixels ? Explain? **[8]**

OR

- Q2) a)** Define the following image processing terms and give their significance. **[10]**
- i) Mean
 - ii) Standard Deviation
 - iii) Variance
 - iv) Signal to Noise Ratio.
 - v) Histogram of an Image.
- b) Explain Mach Band Effect and simultaneous contract wrto Digital Image? **[8]**

P.T.O.

- Q3)** a) What is Histogram Equalization and Histogram Matching? Explain Histogram Equalization in detail. [8]
- b) Explain the following image Enhancement techniques,
- i) Power law transformation
- ii) Contrast stretching. [8]

OR

- Q4)** a) Explain in detail Gaussian filtering with example? [8]
- b) What are the different image enhancement filters used in frequency domain? Explain. [8]

- Q5)** a) What is Hough Transform? Explain, how it is useful in line detection? [8]
- b) What is Global thresholding and Local thresholding? How, we can select threshold value for optimum segmentation. [8]

OR

- Q6)** a) Explain region splitting and merging for image segmentation? [8]
- b) How, Histogram is used for image segmentation? Give the algorithm for threshold selection using Histogram? [8]

SECTION-II

- Q7)** a) What are the different types of data redundancies in an image? Explain ? [10]
- b) What is lossy compression and lossless compression? Compare based on performance parameters, advantages, disadvantages and applications. [8]

OR

Q8) a) Define Discrete cosine Transform? Explain, how it can be used for image compression? [10]

b) Explain the Image pyramid used for multiresolution image analysis? [8]

Q9) a) Find the expression for the signatures of the following boundaries and plot the signatures. [8]

i) Square

ii) Equilateral Triangle.

b) What is Texture? How it is identified? Give the application of Texture analysis? [8]

OR

Q10)a) Explain any two descriptors used for Boundary description? [8]

b) What is skeletonization ? Explain, how it can be used for image representation. [8]

Q11)a) What is Graph theory? Explain the use of Graph theory for object Recognition? [8]

b) What is statistical pattern Recognition & Syntactic pattern Recognition? Compare the same? [8]

OR

Q12)a) Explain the concept of 3D vision? What is its application? [8]

b) Give the algorithm for finger print recognition in Digital Image Processing?

Also, list the features to be extracted for finger print recognition. [8]



Total No. of Questions : 12]

SEAT No. :

P3169

[Total No. of Pages : 3

[4859]-126

B.E. (Electronics)

OPTICAL AND MICROWAVE COMMUNICATION
(2008 Pattern) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 questions from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Draw block diagram of optical fiber communication system. Explain in detail key elements of optical fiber systems. [6]
- b) In a multimode step index fiber, following parameters were measured : [4]
- i) No. of modes passing at an operating wavelength of 1300 nm are 1000.
 - ii) Refractive index of core : 1.50
 - iii) Refractive index of cladding : 1.48
- Determine core diameter of above step index fiber.
- c) Explain the following types of fibers with their characteristics. [6]
- i) Multimode step index fiber.
 - ii) Multimode graded index fiber.
 - iii) Single mode step index fiber.

OR

- Q2)** a) Draw neat construction of single mode Laser and explain it. [8]
- b) Explain in detail external type of modulator's for LASER with diagram. [8]

P.T.O.

- Q3)** a) What is dispersion? Explain intermodal dispersion and intramodal dispersion. [8]
b) What are the different types of optical amplifiers? Explain it in brief. [8]

OR

- Q4)** a) State the functions of passive optical couplers. Draw and explain 2×2 Fiber coupler. [8]
b) Write a short note on SONET/SDH networks. [8]

- Q5)** Write short notes on : [18]
a) Interferometric method of measurement of length.
b) Laser instruments for surgery.
c) Laser Welding.

OR

- Q6)** a) Explain how LASER can be used in trimming of resistor. [6]
b) Draw set up for liquid level measurement and explain it. Also explain the structure of optical sensor used in this application. [8]
c) Explain Pulse-Echo technique in brief. [4]

SECTION - II

- Q7)** a) What do you understand by waveguide modes? What are dominant modes? [8]
b) Differentiate between group velocity and phase velocity as applied to waveguides. [4]
c) An air filled rectangular waveguide has dimension of $6 \text{ cm} \times 4 \text{ cm}$. The signal frequency is 3 GHz. Compute the following for TE_{10} mode. [6]
i) Cut off frequency.
ii) Wavelength in the waveguide.
iii) Wave impedance in the waveguide.

OR

- Q8)** a) Write short note on following : [8]
i) Microwave isolator.
ii) S Matrix and its properties.
b) Explain the construction and working of gyrator based on Faraday's rotation principle. [6]
c) What is hybrid E-H plane Tee referred to as a Magic Tee? [4]

- Q9)** a) Compare two cavity Klystron and reflex Klystron with relevant sketches. [8]
- b) What do you mean by cross field device? Explain the phase focussing effect in magnetron. [8]

OR

- Q10)** a) Draw the construction of TWT and explain its operation. State the applications of TWT. [8]
- b) A reflex Klystron operates under the following conditions : [8]

$$V_o = 600\text{V}, L = 1\text{mm}, R_{sh} = 15 \text{ k}\Omega, f_r = 9\text{GHz}, \frac{e}{m} = 1.759 \times 10^{11}.$$

The tube is oscillating at f_r at the peak of the $n = 2$ mode $1\frac{3}{4}$ mode.

Assume that the transit time through the gap and beam loading can be neglected.

- i) Find the value of the repeller voltage.
- ii) Find the direct current necessary to give a microwave gap voltage of 200V.
- iii) What is the electronic efficiency under this condition?

- Q11)** a) Explain the various modes of operation of Gunn diode. [8]
- b) Explain principle of operation, I-V characteristics and equivalent circuit of microwave tunnel diode. [8]

OR

- Q12)** a) Describe the amplification mechanism of parametric amplifier with the help of equivalent circuit. [8]
- b) Write short note on following : [8]
- i) Schottky diode.
 - ii) PIN diode.



Total No. of Questions : 12]

SEAT No. :

P3551

[Total No. of Pages : 3

[4859] - 126A

B.E. (Electronics)

SOFT COMPUTING TOOLS

(2008 Pattern) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer one question each among Q1 OR Q2, Q3 OR Q4 and Q5 OR Q6.*
- 2) *Answer one questions each among Q7 OR Q8, Q9 OR Q10 and Q11 OR Q12.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of electronic pocket calculator is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Draw the block diagram of an intelligent system and explain its working. [6]
b) Compare hard and soft computing. [6]
c) Write short note on Neuro-Fuzzy and soft computing characteristics. [6]

OR

- Q2)** a) Explain the role of neural networks in soft computing. [6]
b) What is fuzzy set theory? Where it is used in soft computing. [6]
c) Write short note on applications of soft computing. [6]

- Q3)** a) Explain any eight features of a membership function defining a fuzzy set in detail. [8]
b) Write short note on properties of and operations on fuzzy sets. [8]

OR

- Q4)** a) Explain in detail Centroid method and Max-Membership principle method for de-fuzzification. [8]
b) Write short note on fuzzy rules. [8]

P.T.O.

- Q5)** a) Draw the architecture of fuzzy control system and explain its working in detail. [10]
b) What are the advantages of fuzzy controllers over that of conventional controller? [6]

OR

- Q6)** a) Which steps are involved in designing of a fuzzy controller. [8]
b) Write short note on applications of fuzzy control systems. Explain any one application in detail. [8]

SECTION - II

- Q7)** a) Draw and explain the structure of biological neuron with details about electrical activities in it. [8]
b) Explain in detail back propagation training algorithm. [10]

OR

- Q8)** a) Draw the Rosenblatt's Perceptron model of a neuron and explain its working. Implement a neural network for ANDNOT function with bipolar data using perceptron learning rule. [12]
b) What is topology of a neural network? Explain different topologies with neat diagrams. [6]

- Q9)** a) What is activation function? Enlist the various activation functions used in neural network and explain one in detail. [8]
b) State different types of learning used in neural networks and explain them with suitable examples. [8]

OR

- Q10)** Write short note on applications of neural networks and explain any two in detail. [16]

- Q11)** a) Draw the architecture of ANFIS and explain it in detail. [8]
b) Write short note on advantages and disadvantages of ANFIS over FIS. [8]

OR

Q12) Use RBFN and train it to solve the XOR problem whose details are given below : **[16]**

Input-Output table:- X_1 and X_2 are inputs and Y is output.

X_1	X_2	Y
0	0	0
0	1	1
1	0	1
1	1	0

Network parameters :

Assume two clusters with centers as $C_1 = [0, 0]$ and $C_2 = [1, 1]$.
Select the two ϕ - functions as Gaussian with $\mu = 0$ and $\sqrt{1/2}$, Use direct solution approach instead of gradient decent for the supervised training.



Total No. of Questions : 12]

SEAT No. :

P1764

[4859]-127

[Total No. of Pages :3

B.E. (Electronics)
Advanced Communication System
(404210) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) *Answer three questions from I and Three questions from section II*
- 2) *Answer to the two sections should be writeen in separate.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Black figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Describe in detail working of Cellular system. **[8]**
- b) Discuss How Cell splitting and frequency reuse in mobile communication enhances spectral efficiency. **[6]**
- c) Write note on cell sectorization **[4]**

OR

- Q2)** a) State and describe formula for mobile radio propagation between fixed stations. **[8]**
- b) How CCIR can be calculated in mobile environment? **[6]**
- c) Define Line of sight & Obstructive Path **[4]**

- Q3)** a) Describe Interference reducing directional antennas and space diversity antenna. **[8]**
- b) Describe the following w.r.t. mobile communication **[8]**
- i) Underlay - overlay
 - ii) Handoffs & dropped calls

OR

P.T.O.

- Q4)** a) Derive free space path loss formula for wireless communication. [8]
b) With the help of suitable example describe various interferences occurred in reception of signal. [8]

- Q5)** a) With neat block diagram, describe GSM architecture in detail. [8]
b) How security is achieved in Mobile network? Explain algorithms related to Security. [8]

OR

- Q6)** a) Describe the architecture of GPRS. [8]
b) With the help of suitable diagram, explain macro cells & microcell to enhance the capacity. [8]

SECTION-II

- Q7)** a) Compare LEO, MEO and GEO Satellites. [8]
b) Draw the block diagram and explain Attitude and Orbit Control subsystem of a satellite. [8]

OR

- Q8)** a) Draw and explain major subsystems on a satellite. [8]
b) Define and explain the following terms with respect to the satellite communication [8]
i) Poles
ii) Latitude

- Q9)** a) A SCPC- FM satellite link has an RF channel bandwidth of 45 kHz and a base band maximum frequency of 3.4 kHz. De-emphasis provides a subjective improvement in base band S/N ratio of 7dB. Calculate the base band S/N ratio for the voice channel for a receiver C/N ratio of 13dB. If the FM demodulator has an FM threshold at 6dB, what is the link margin for this system? [8]
b) Define and explain the following terms with reference to the FM techniques
(iii) Signal to Noise Ratio [8]
iv) Pre- emphasis & De- emphasis?

OR

Q10) a) A satellite transponder has a bandwidth of 358.4 MHz .Earth stations use RRC filters with $\alpha = 0.4$. What is the maximum bit rate that can be sent through this transponder with BPSK and QPSK? [8]

b) Define & explain the following terms with reference to the digital modulation techniques used on satellite links. [8]

iii) Non -uniform Quantization

iv) Symbol Error Rate

Q11)a) What are the various ‘Multiple Access Techniques’ used in modern satellite communications? Compare them. [9]

b) Define and explain the meaning of VSAT? Explain various VSAT network configurations with the help of a hub. List the applications of VSAT. [9]

OR

Q12) a) Explain with a neat diagram the FDMA frame structure. [9]

b) Explain the terms with respect to VSAT. [9]

i) link budget.

ii) Free space path loss.

iii) Edge of coverage loss.



Total No. of Questions : 11]

SEAT No. :

P3170

[Total No. of Pages : 3

[4859]-128

B.E. (Electronics)

AUTOMOTIVE ELECTRONICS SYSTEMS

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw suitable diagrams wherever necessary.*

SECTION - I

- Q1)** a) With the help of a diagram, describe working of 4-stroke petrol engine used in automobile. **[8]**
- b) Explain utility of Battery in automotive systems. **[8]**

OR

- Q2)** a) Compare battery operated vehicles with conventional fuel operated vehicles. **[8]**
- b) What is Transmission system? Explain types of Transmission system in brief. **[8]**

- Q3)** a) Explain the operation of temperature sensing system in automobile. How it can be co-related with cooling. **[8]**
- b) Describe working of automotive system with reference to anticollision & distance sensing. **[8]**

OR

- Q4)** a) Explain position sensors with reference to tyre & differential using necessary diagram. **[8]**
- b) Explain the working of Instrumentation amplifier. How it is useful for signal conditioning. **[8]**

P.T.O.

- Q5)** a) Explain Engine management system in detail. [8]
b) How will you control electronically - [10]
i) Lighting in automotive
ii) Wipers in automotive

- Q6)** a) Explain the control strategy for
i) Anti theft system [5]
ii) Air Conditioning/Heating [5]
b) Describe the methods of improving engine performance & its efficiency. [8]

SECTION - II

- Q7)** a) Explain the significance of interrupts & watch dog timers. [8]
b) Justify the real time programming in automotive systems. [8]

OR

- Q8)** a) Explain the procedure of software testing & debugging. [8]
b) Write a C program to blink LED indicator when the car crosses a certain speed limit. Explain the algorithm to control the speed. [8]

- Q9)** a) What is ECU in automotive system. How the electronic gadgets are interfaced to it? [8]
b) Write a short note on higher end technologies in automotive systems. [5]
c) Explain in brief: application of Telematics in automotives. [5]

- Q10)** a) Describe Bluetooth Technology with its working principle applications & limitations. [8]
b) Explain in detail : CAN & LIN buses. [10]

- Q11)** a) Explain in detail about passenger comfort & security system in automotive system. [8]
- b) Write a sequential process of trouble shooting & fault finding of electronic systems in automotive system. [8]

OR

Write a short note on :

- a) Automotive EMC standards. [6]
- b) On board & Off board diagnostic in automotive. [6]
- c) Basic & multiplex wiring in automotive system. [4]



Total No. of Questions : 12]

SEAT No. :

P1765

[4859]-129

[Total No. of Pages :3

B.E. (Electronics)

c-ARTIFICIAL INTELLIGENCE

(2008 Course) (Semester-II)(Elective-IV) (404210)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rules, electronic calculators are not allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Define the term “Artificial Intelligence”. Explain any two applications of artificial intelligence in detail. [9]

b) Define an ideal rational agent? Detail the architecture of an agent. [9]

OR

Q2) a) Explain different uninformed searching techniques [6]

b) Explain the turing test in detail. [6]

c) Explain the significance of PEAS in AI. [6]

Q3) a) Explain Minmax algorithm with suitable example. [8]

b) Apply constraint satisfaction to solve following cryptarithmic problem to assign unique single digit number 0 to 9 each alphabet.

EAT+THAT=APPLE [8]

OR

P.T.O.

Q4) a) Explain Hill climbing algorithm. Explain plateau, ridge, local maxima and global maxima. [8]

b) Define the term Heuristic function. Explain its significance with suitable example. [8]

Q5) a) What is predicate logic? Describe the advantages of predicate logic over propositional logic. [8]

b) Explain forward and backward chaining. [8]

OR

Q6) a) Explain working of unification algorithm with suitable example. [8]

b) Explain all first order logic symbols with suitable example. [8]

SECTION-II

Q7) a) Differentiate between passive reinforcement and active reinforcement learning. [8]

b) Explain types of Artificial Neural Network with its applications. [10]

OR

Q8) a) Explain the decision tree algorithm with suitable example. [9]

b) Explain different learning methods with suitable examples. [9]

Q9) a) Explain perception confined to vision and speech recognition. [8]

b) Describe the architecture and functionality of expert system. [8]

OR
2

Q10)a) Explain characteristics of Expert systems and explain the expert systems ELIZA and MYCIN. [8]

b) Explain the Waltz's algorithm with suitable example. [8]

Q11)a) Describe the syntactic analysis with example. [8]

b) Explain semantic analysis phase of natural language processing. [8]

OR

Q12)a) Explain probabilistic language processing? [8]

b) Parse each of statements using top-down and bottom-up approach. [8]

i) Lata sang a song.

ii) The sweet girl played cricket.



Total No. of Questions : 12]

SEAT No. :

P1683

[4859]-13

[Total No. of Pages : 3

B.E. (Civil)

**e-ADVANCED CONCRETE TECHNOLOGY (Theory)
(2008 Course) (Semester-I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures in the bracket indicate full marks.*
- 5) *Electronic pocket calculator is permitted.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What are the different grades of ordinary Portland cement? Name few brands available in the market. [5]
- b) Explain coning and quartering method of obtaining laboratory sample of aggregates. [5]
- c) Explain the dry process of manufacturing of cement along with flow chart for the same. [8]

OR

- Q2)** a) Explain how particle size analysis is useful in concrete mix design. How particle size analysis is done? [8]
- b) Name any five chemical admixtures with their suitability in green concrete. [5]
- c) Explain in aggregate impact value test. [5]

- Q3)** a) Write in detail what do you mean by light weight concrete. What are its advantages? [8]
- b) Write a detailed note on “Design of No Fines concrete mixes”. [8]

OR

P.T.O.

- Q4)** a) What is meant by long term performance of concrete? What properties a high strength concrete should possess for long term performance? [8]
- b) What are the advantages of using high strength concrete? [8]

- Q5)** a) What is the difference between non-destructive and semi-destructive methods. [8]
- b) Enlist various non-destructive methods with their utility in brief. [8]

OR

Q6) Write notes on:

- a) Core Test. [5]
- b) Ground penetration method. [5]
- c) Infrared thermography. [6]

SECTION-II

- Q7)** Explain the following terms: [18]
- a) Classification of artificial fibres.
- b) Relative fibre matrix stiffness.
- c) Fibre matrix interfacial bond.
- d) Factors affecting properties of FRC.

OR

- Q8)** a) Write a note on self compacting concrete. What are the properties of self compacting concrete? [8]
- b) Write notes on:
- i) SIFCON. [5]
- ii) SFRC. [5]

- Q9) a)** Write notes on: **[8]**
Behaviour of SFRC in tension and compression.
- b) Write notes on: **[8]**
- i) Steel fibres.
 - ii) Glass fibres.

OR

- Q10)a)** What is compact cube test? How it is useful in determining the efficiency of FRC in shear? **[6]**
- b) Write notes on:
- i) Polymer impregnated concrete. **[5]**
 - ii) Slurry infiltrated fibre concrete. **[5]**

- Q11)a)** Explain Centrifuging and Guniting techniques of ferrocement casting. **[8]**
- b) Enlist the various components where ferrocement can be used. **[4]**
- c) Write the advantages and disadvantages of open mould method. **[4]**

OR

- Q12)a)** Explain skeletal armature method of ferrocement along with merits and demerits. **[8]**
- b) Explain the skeletal steel reinforcement in ferrocement. **[4]**
- c) Write the advantages of ferrocement. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1766

[4859]-130

[Total No. of Pages :2

B.E. (Electronics)

**d-NANOTECHNOLOGY IN ELECTRONICS
(Semester-II) (2008 Course) (Elective-IV)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain molecular recognition in detail. [8]
b) Explain scanning probe Instruments. [8]

OR

- Q2)** a) Explain NanoCAD, a tool to imagine nanoscale behaviours. [8]
b) Explain Dip pen Nanolithography in detail. [8]
- Q3)** a) Explain Novel dielectric materials for future transistors. [8]
b) What is silicon nanocrystal? How it is used in non volatile memories. [8]

OR

- Q4)** a) Explain the nanoscale lithography. [8]
b) What are nano-CMOS devices? Where are they used? [8]
- Q5)** a) Explain metal nanostructure & semi-conducting nanoparticles. [10]
b) Explain different properties of nanotubes. [8]

OR

P.T.O.

- Q6)** a) Explain carbon molecules and carbon clusters related to carbon nano structure. [10]
b) Explain any two applications of carbon nanotubes. [8]

SECTION-II

- Q7)** a) Explain molecular and supramolecular switches. [8]
b) How the airbags are activated in automobiles by principle of micro electromechanical (NAMS). [8]

OR

- Q8)** a) Explain lithography. [8]
b) Explain nanodevices and nanomachines. [8]

- Q9)** a) Explain the tools of manufacturing of nano and micro fabrication. [8]
b) Explain an automatic lithography. [8]

OR

- Q10)**a) Explain the electron beam lithography. [8]
b) Explain the nanoelectronics for advanced computation and communication. [8]

- Q11)**a) Enlist the applications of nano structures in electronics. Explain any one in detail. [10]
b) Explain the applications of nanotechnology to capture the light energy. [8]

OR

- Q12)**a) In optics how the nanotechnology is used. [8]
b) What are different applications of nanotechnology in Biomedical Electronics. [10]



Total No. of Questions : 12]

SEAT No. :

P3171

[Total No. of Pages : 3

[4859]-131

B.E. (Production) (Semester - I)

MACHINE TOOL DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Attempt any one question from each unit of Section I and Section II respectively.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of non-programmable electronic pocket calculator and statistical tables is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

UNIT - I

- Q1)** a) What are the essential considerations in designing an epicyclic mechanism to obtain stepless speeds in a machine tool? [4]
- b) An eight speed gear box is to be designed for the minimum speed of 120 rpm and maximum speed of 1440 rpm. It is to be driven by an induction motor rotating at 1440 rpm. Draw best structural diagram, optimum ray diagram and gear box layout. [14]

OR

- Q2)** a) Deduce the expression for power in vertical milling machine and show diagrammatically the forces acting on milling cutter during machining. [10]
- b) Show that geometric progression ratio (ϕ) lies between 1 and 2. Also prove that maximum loss of economic speed is constant in geometric progression. [8]

UNIT - II

- Q3)** a) What are the important elements of machine tools? Explain their functioning and importance in the working of machine tools. [8]
- b) Explain the concept of static and dynamic rigidity of a machine tool and state the procedure for estimating them. [8]

P.T.O.

OR

- Q4)** a) Explain, would it be possible to design and build machining centers without the use of computer controls? [6]
b) Give the comparative evaluation of machine tool structures on the basis of : [10]
i) Profiles of machine tool structures
ii) Materials for machine tool structures

UNIT - III

- Q5)** a) Classify and sketch the various types of guides used in machine tools, based on material, lubrication system, drives control etc. [8]
b) Show that the rigidity of the hydro dynamically lubricated slides is always less than that of hydrostatic slides. [8]

OR

- Q6)** a) Explain the specific merits and demerits of plastic guides commonly used in machine tools. [8]
b) Describe with neat sketches the various methods used for the wear compensation of guides. [8]

SECTION - II

UNIT - IV

- Q7)** a) Sketch unit supports and spindle ends in a high speed machine tools? What are the basic considerations in designing the spindle unit supports? [10]
b) Explain the necessity to preload the bearings of spindle mountage? [8]

OR

- Q8)** a) Explain the working principle in recirculating ball screws, commonly used in CNC versions. What are its special advantages? [8]
b) Explain the method of compensating the errors resulting due to backlash (pitch error) with neat sketches. [10]

UNIT - V

- Q9)** a) Enumerate why damping and thermal expansion is important in machine tools? [8]
b) Write a note on dynamic characteristic of the cutting process. [8]

OR

- Q10)** a) Justify clearly the stick-slip motion and its effect in the performance in machine tools. [8]
b) Describe the procedure followed in carrying performance tests for machine tools. [8]

UNIT - VI

- Q11)** a) Explain the importance of aesthetics, in the design of modern machine tools. [8]
b) How the concept of matrices is applied in the design of layout of machine tools. Explain with a suitable example. [8]

OR

- Q12)** a) Discuss the advantages of retrofitting in building machine tools. [8]
b) Justify the techniques that can be applied in design of machine tool structures for micro machining. [8]



Total No. of Questions : 12]

SEAT No. :

P1767

[4859]-132

[Total No. of Pages :3

B.E. (Production)
MANUFACTURING AUTOMATION
(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data if necessary.*

SECTION-I

Q1) a) For a radial piston pump:

- i) Explain the principle of working. [2]
 - ii) Draw neat sketch. [2]
 - iii) Explain the characteristics, advantages, and disadvantages. [2]
 - iv) Discuss its applications. [2]
- b) What are the advantages of hydraulic drives over mechanical drives?[8]

OR

Q2) a) For an internal gear pump:

- i) Explain the principle of working. [2]
 - ii) Draw neat sketch. [2]
 - iii) Explain the characteristics, advantages, and disadvantages. [2]
 - iv) Discuss its applications. [2]
- b) Explain with neat sketch the hydraulic servo system for position control. [8]

P.T.O.

- Q3) a)** For a meter in hydraulic circuit, calculate the pump pressure required to achieve 50 bar pressure at full bore end of cylinder if the pressure loss across various elements is as below: Flow control valve=12 bar, direction control valve (both side)=2bar, filter=3 bar. [8]
- b) Show that in regenerative circuit the extension speed of the piston is about twice the extension speed in normal circuit for the same pump flow. [8]

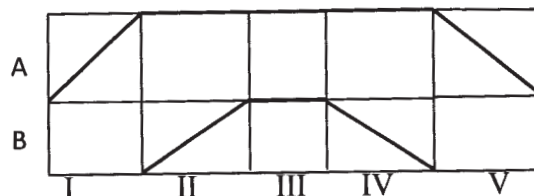
OR

- Q4) a)** A punching operation requires 130 lpm for 0.7 seconds in total cycle time is of 6 seconds. Determine the volume change in accumulator during discharge. [8]
- b) Explain with neat sketch the design aspects of hydraulic reservoir. [8]

- Q5) a)** Draw a pneumatic circuit for power door opening system in which the operators need to activate the door cycle from both inside and outside by pushing a button. The door needs to remain open for an adjustable time period before it automatically closes. The operators must also have a means to keep the door open continuously when needed. [10]
- b) Explain with suitable example the working of a twin pressure valve. [8]

OR

- Q6) a)** Draw the suitable pneumatic circuit using cascade system to actuate cylinder A and cylinder B as per following position step diagram. [12]



- b) Explain the use of turbulence amplifier for logic circuit. [6]

SECTION-II

- Q7)** a) What do you mean by a dedicated bus? [8]
b) Write a program for 8085 A μ p to find smallest element in a block of 8-bit unsigned binary data, whose number is stored in the memory location A001H, and the data are stored in a memory location beginning from A002H. Store the smallest number in a memory location FF00H. [8]

OR

- Q8)** a) Explain the possible instructions to clear the accumulator of 8085 A. [8]
b) How many status flag does 8085 have? Discuss the role of each flag. [8]

- Q9)** a) Draw the PLC logic diagram to control a process which is desired to start by turning on the motor in 10 seconds after the part touches the limit switch. The process should be terminated automatically when the finish part touches the second limit switch. An emergency switch will stop the process any time when it is pressed. [10]
b) Explain with suitable example the use of counters in PLC. [6]

OR

- Q10)** a) State the conditions in which the PI controller should be used. [6]
b) What are the various components of process control system? Explain the function of each component briefly. [10]

- Q11)** a) A feeder selector device at one of the stations of an automatic assembly machine has a feed rate of 22 parts/min and provides a throughput of one part in four. The ideal cycle time of the assembly machine is 10 sec. The feeder stops for 18 parts in feed track and will start while 8 parts in feed track. Determine how long will it take for the feeder to turn on once it is turned off and how long it will take to turn off once it is turned on? [9]
b) Explain with neat sketches various types of rotary feeders. [9]

OR

- Q12)** Write short notes on: [18]
a) Automated warehouse.
b) Rotary transfer machine.
c) Applications of redundant robot manipulators.



Total No. of Questions : 12]

SEAT No. :

P1768

[4859]-133

[Total No. of Pages :5

**B.E. (Production Engineering)
OPERATIONS RESEARCH
(2008 Course) (Semester-I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt question 1 or 2 , 3 or 4 and 5 or 6 from Section I.*
- 2) *Attempt question 7 or 8, 9 or 10 and 11 or 12 from Section II.*
- 3) *Draw flow chart wherever needed.*
- 4) *Use of normal distribution Table is permitted.*

SECTION-I

Q1) a) Write the Dual and solve the dual problem **[12]**

$$\begin{aligned} \text{Minimize : } Z = & 3x_1 + 4x_2 \\ & 2x_1 + 3x_2 \geq 13 \\ & 5x_1 + 2x_2 \geq 16 \\ & x_1, x_2 \geq 0 \end{aligned}$$

b) Discuss sensitivity analysis for LP **[5]**

OR

Q2) a) Solve by Simplex method: **[10]**

$$\begin{aligned} \text{Maximize: } Z = & 100x_1 + 90x_2 \\ & x_1 + 2x_2 \leq 14 \\ & 5x_1 + 4x_2 \leq 58 \\ & x_1, x_2 \geq 0 \end{aligned}$$

b) Discuss Duality **[7]**

P.T.O.

Q3) a) Discuss Travelling Salesman Problem [6]

b) A company has three factories F1, F2 and F3 and goods are supplied to 4 different cities D1, D2, D3 and D4. The table shows per unit cost of transportation. The supply capacities and demand are as shown in the tabel.

Factories	Consumption centers				Capacity
	D1	D2	D3	D4	
F1	19	30	50	10	70
F2	70	30	40	60	90
F3	40	8	70	20	180
Demand	50	80	70	140	

1. Find BFS by LCM. [6]

2. Optimize by MODI method. [5]

OR

Q4) a) Discuss transshipment problem. [6]

b) Four operators are to be assigned one job each. The matrix represents the cost for assignments for five jobs. [11]

Operators	Jobs				
	I	II	III	IV	V
A	8	7	12	15	9
B	9	7	11	18	11
C	10	9	14	16	12
D	8	10	10	19	10

Find the optimal assignments. Which job is unassigned?

- Q5)** a) Discuss Branch and Bound method. [5]
 b) Explain Goal programming. [6]
 c) Discuss application for Dynamic programming. [5]

OR

- Q6)** a) Discuss geometric programming and its applications. [5]
 b) Discuss Integer programming formulation. [6]
 c) Discuss state and stage as used in Dynamic programming. What is return function. [5]

SECTION-II

- Q7)** a) The cost of a new machine is Rs. 20 000/- The running costs are given in table below. The resale value of the machine is zero. Assuming a 10% rate of money per year determine when the machine should be replaced. [10]

Year	1	2	3	4	5	6	7	8
Running cost (Rs)	2000	2500	3200	4500	5400	6500	8500	11000

- b) Discuss Minimax and Maximin rule with saddle point. [6]

OR

- Q8)** a) Discuss individual and group replacement policies. [8]
 b) Solve the game: [8]

		B			
		B1	B2	B3	B4
A	A1	2	4	3	8
	A2	5	6	3	7
	A3	6	7	9	8
	A4	4	2	8	4
	A5	3	6	8	7

- Q9) a)** Annual demand for an item is 400 units. Ordering cost is 50 Rs. per order. Inventory carrying cost is 20 Rs per unit per year. [10]

Quantity	Price (Rs.) per unit
$0 \leq Q_1 < 1000$	200
$1000 \leq Q_2 < 2000$	170
$2000 \leq Q_3$	140

Find the optimal order size.

- b) Discuss Kendall Notation. [6]

OR

- Q10)a)** Arrival rate of the customers at the banking counter follows Poisson distribution with mean 20 per hour. The service rate of the counter also follows Poisson distribution with mean of 33 per hour. Find.

- i) Probability of having zero customers in the system. [2]
- ii) Probability of having 3 customers in the system. [2]
- iii) Probability that customer have to spend 30 minutes in bank. [2]
- iv) Mean customers in queue. [2]
- v) Average waiting time in queue. [2]

- b) Derive equation for Economic Production Quantity. State your assumptions. [6]

- Q11)a)** Network is given below with three time estimates.

Activity	1-2	2-3	2-4	3-5	4-5	4-6	5-7	6-7	7-8	7-9	8-10	9-10
Optimistic	1	1	1	3	2	3	4	6	2	4	1	3
Most likely	2	2	3	4	3	5	5	7	4	6	2	5
Pessimistic	3	3	5	5	4	7	6	8	6	8	3	7

- i) Construct the project network. [2]
- ii) Find critical activities and critical path. [4]
- iii) How much is expected project duration? [1]
- iv) Find probability that project takes more than 30 days. [2]
- v) Find probability that project is completed in 27 days. [2]
- vi) Find the expected project duration for 95% confidence level? [2]

- b) State different types of floats and discuss any three. [5]

OR

- Q12)a) Table below shows jobs, normal & crash time & cost for a project. Indirect cost for the project is Rs. 300 per day.

Activity	Normal		Crash	
	Time	Cost	Time	Cost
1-2	6	1400	4	1900
1-3	8	2000	5	2800
2-3	4	1100	2	1500
2-4	3	800	2	1400
3-4	0	0	0	0
2-5	6	900	3	1600
4-6	10	2500	6	3500
5-6	3	500	2	800

Find the optimum project completion time for minimum cost.

- i) Draw the network of the project. [2]
- ii) What is the normal duration & cost of project? [5]
- iii) Find the optimum duration & minimum project cost. [5]
- iv) If all activities are crashed, what will be the project duration. [1]
- b) Discuss forward and backward pass. [5]



Total No. of Questions : 12]

SEAT No. :

P3172

[Total No. of Pages : 2

[4859]-134

B.E. (Production)

PLASTIC ENGINEERING

(2008 Pattern) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Answer any three questions from each section.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of calculator is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Explain concept of polymerization. [8]
b) Discuss additives used in the plastic. [10]
OR
- Q2)** a) Explain, concept of addition. [8]
b) Explain coloring of plastic. [10]
- Q3)** a) Explain any two cooling methods of Injection moulds. [8]
b) Explain how to specify moulding machine. [8]
OR
- Q4)** a) Explain functions of register ring. sprue bush with suitable sketches. [8]
b) Explain effect of processing on mechanical properties of product. [8]
- Q5)** a) Explain extrusion of pipes with suitable sketches. [8]
b) Discuss various problems observed in extrusion. [8]
OR
- Q6)** a) Explain process of extrusion coating. [8]
b) Explain blown film extrusion. [8]

P.T.O.

SECTION - II

- Q7)** a) Compare injection blow & extrusion blow molding processes. [10]
b) Explain materials for blow moulding. [8]

OR

- Q8)** a) Explain bottle design concept with suitable sketches. [8]
b) Explain basic design considerations in blow molding. [10]

- Q9)** a) Discuss various problems observed in thermoforming. [8]
b) Explain twin sheet thermoforming with suitable sketches. [8]

OR

- Q10)** a) Explain vacuum forming with suitable sketches. [8]
b) Discuss process factors in thermoforming. [8]

- Q11)** a) Explain principle considerations in tapping and turning operations in plastic. [10]
b) Explain : [6]
i) Buffing.
ii) Filing.

OR

- Q12)** a) Explain principle considerations in sawing. piercing operations in plastic. [10]
b) Explain tumbling in plastic. [6]



Total No. of Questions : 12]

SEAT No. :

P2035

[4859]-135

[Total No. of Pages : 3

B.E. (Production) (Semester - I)
INDUSTRIAL ROBOTICS
(2008 Pattern) (Elective - I(b))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

- Q1)** a) Define Industrial Robot & explain the robot anatomy. [8]
b) Differentiate between resolution and accuracy of robot with the help of neat sketch. Also explain the repeatability of robot. [8]

OR

- Q2)** a) Explain six degrees of freedom associated with the robot manipulator with neat sketch. [8]
b) Enlist the chronological development process in each Robot generation. [8]

Unit - II

- Q3)** a) Explain the Forward kinematics associated with planar 3R manipulator. [8]
b) For a pick and place type of robot, the link parameters table is given below : [8]

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{i-1}
1	0	0	0	30°
2	-90	0	2	0°
3	0	3	0	90°

Determine the location of the end point of the link w.r.t the base.

OR

- Q4)** a) Explain the Inverse kinematics associated with planar 3R manipulator. [8]
b) For a pick and place type of robot, the link parameters table is given below : [8]

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{i-1}
1	0	0	0	45°
2	-90	0	2	-90°
3	0	5	0	60°

Determine the location of the end point of the link 3 w.r.t. the base.

P.T.O.

Unit - III

- Q5)** a) What is gripper? Discuss the various considerations in gripper design and selection. [9]
b) Explain with neat sketch : [9]
i) Vacuum gripper
ii) Ultrasonic gripper

OR

- Q6)** a) Explain with neat sketch : [9]
i) Gear and Rack method of actuating the gripper
ii) Cam-actuated gripper
iii) Screw - type gripper actuation
b) Explain force analysis in gripper system. [9]

SECTION - II

Unit - IV

- Q7)** a) Is there a need of Sensor in Robot? If yes, state why? [8]
b) Explain machine vision system with the help of block diagram. [8]

OR

- Q8)** a) Explain various Sensing devices used in Robot workcell. [8]
b) The given data represents 8×8 arrays of pixels. Each element in the array indicates the grey level value of the pixels. [8]
i) Construct histogram for the array and obtain appropriate threshold value.
ii) Convert the picture into a black and white image. The data is as:

10	11	10	11	12	12	12	12
13	15	17	17	17	17	15	13
14	17	19	19	19	19	18	14
13	17	19	20	20	19	18	13
12	17	19	20	21	19	18	12
12	17	19	19	19	19	18	12
11	15	18	18	18	18	15	11
12	11	10	11	12	12	12	12

Unit - V

- Q9)** a) Explain the generations of Robot programming Language. [8]
b) Explain : [8]
i) Manual mode of programming.
ii) Lead through mode of programming.
iii) Textual robot language
iv) Off-line programming mode.

OR

- Q10)**a) Compare hydraulic, electric and pneumatic drive system used in Industrial Robotic system. [8]
- b) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands with suitable example. [8]

Unit - VI

- Q11)**a) Write short note on RS 232C interface used in Robotics system. [9]
- b) How is software and hardware of robot, handshaking with PC done?[9]

OR

- Q12)**a) Write a note on : [9]
- i) Spot welding
 - ii) Machine loading and unloading
 - iii) Spray Painting
- b) Describe the concept of safety in robotics. [9]



Total No. of Questions : 12]

SEAT No. :

P2036

[4859]-136

[Total No. of Pages : 2

B.E. (Production Engg.) (Semester - I)
POWDER METALLURGY
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section-I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the Pyron process of powder production. [6]
b) Write short note on the centrifugal atomization process of powder production. [6]
c) What is the influence of Particle size and size distribution, tap density and compression ratio on the behavior of powders. [6]

OR

- Q2)** a) What are the factors which promote powdery deposits in electrolytic cell? [6]
b) Explain the carbonyl process of powder production with a neat diagram. [6]
c) Describe with a neat diagram any one method to characterize the size of powders. [6]

- Q3)** a) Write short notes on : [8]
i) Different types of mixers.
ii) Slip casting
b) How can we avoid the large variation of green density of compact? [8]

OR

- Q4)** a) State and explain in brief the essential compacting tools. Write a short note on the mechanical press. [8]
b) Compare hydraulic press with mechanical press. What are the essential compacting tools and state the steel from which they are made? [8]

P.T.O.

- Q5)** a) Explain the three zones of the mesh belt conveyor sintering furnace with the help of a diagram. [8]
b) Explain the three stages of Liquid phase sintering and state the applications of liquid phase sintering. [8]

OR

- Q6)** a) State and explain the purpose of different atmospheres in sintering furnaces. [8]
b) Explain the mechanism of Sintering in the solid state with a neat diagram. [8]

SECTION - II

- Q7)** a) Write short notes on : [8]
i) Explosive compaction
ii) Powder forging
b) State the Advantages and Limitations of metal injection moulding process. [8]

OR

- Q8)** a) Explain Roll Compaction process with a neat diagram. [8]
b) Explain in details Hot Isostatic Pressing (HIP) with a neat diagram. [8]

- Q9)** a) What is the main drawback in the heat treatment of P/M parts? How can it be overcome? What are the property improvements after heat treatment? [8]
b) Explain sizing, coining and impregnation. Where is impregnation used? [8]

OR

- Q10)** a) Explain any two post sintering treatments. [8]
b) Why is the powder metallurgy process preferred over the conventional manufacturing processes? Explain with suitable examples. [8]

Q11) With the help of a neat flow chart explain production details of the following: [18]

- a) Electrical Contact Materials
b) Brakes and clutch lining material
c) Self lubricated porous bearings.

OR

Q12) With the help of a neat flow chart explain production details of the following: [18]

- a) Refractory metal components
b) Filters
c) Cemented Carbide tools

❧❧❧

Total No. of Questions : 12]

SEAT No. :

P3173

[Total No. of Pages : 2

[4859]-137

B.E. (Production)

MICROPROCESSORS APPLICATIONS

(2008 Pattern) (Elective - I-(d))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer question Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, wherever necessary.*

SECTION - I

- Q1)** a) Explain any four applications areas of microcontrollers. [8]
b) Compare RISC and CISC microcontrollers. [8]

OR

- Q2)** a) Give the comparison between the Microprocessors and microcontrollers. [8]
b) With the help of block diagram, explain the architecture of microcontroller. [8]

- Q3)** a) Explain the interrupts structure for 8085. [8]
b) How will the instruction get executed in 8085. Explain with the help of example. [8]

OR

- Q4)** a) Which are the buses are available in 8085, explain the organization of bus structure. [8]
b) What are different methods of I/O device interfacing? Differentiate between Polling and interrupt based interfacing. [8]

- Q5)** a) With the help of block diagram, explain architecture of 8051. [10]
b) Explain the interrupts structure of 8051 with IVT. [8]

P.T.O.

OR

- Q6)** a) Draw and explain timer's and counters modes in 8051. [10]
b) With the help of diagram explains the flag register of 8051. [8]

SECTION - II

- Q7)** a) What do you mean by addressing mode? Explain the different addressing modes of 8051 with examples. [8]
b) Explain following instructions of 8051 : [8]
i) MOVX ii) CJNE
iii) DJNZ iv) LCALL

OR

- Q8)** a) Write a program to arrange the numbers in ascending order. [8]
b) Explain the different software development tools used in assembly language programming. [8]

- Q9)** a) What do you mean by PLC? Explain its features and application with examples. [8]
b) Interface 4 seven segment display to 8051. Explain interface signals with diagram. Write assembly language program to display '1234'. [8]

OR

- Q10)** a) Draw the ladder diagram for traffic control system and explain it. [8]
b) Interface 4 × 4 keypad to 8051. Draw interfacing diagram. Write assembly program to interface 4 × 4 keypad. [8]

- Q11)** a) Design a system for Data acquisition using 8051 microcontroller for temperature, humidity pressure and level measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the parameters on LCD. Write the Flowchart and algorithm. [10]
b) Explain RS 232 serial communication protocol with diagram. How to interface the RS 232 with 8051 explain with Diagram. [8]

OR

- Q12)** a) Design a water level controller system. Suggest suitable sensors, signal conditioning and microcontroller. Draw the flowchart for the system. Assume tank with 20 meter length. [10]
b) Compare RS 232, RS 485 and 12C Communication protocol. [8]



Total No. of Questions : 12]

SEAT No. :

P1769

[Total No. of Pages :2

[4859]-138

**B.E.(Production Engineering)
a-Ergonomics and Human Factors in Engineering
(Elective- II) (Semester -I) (2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Describe gross body and local muscular activity in relation with ergonomics. [10]
- b) How does work load and work efficiency have an impact on ergonomics issues. [8]

OR

- Q2)** a) Write a note on strength and endurance. [8]
- b) What is biomechanics? Explain in brief. [6]
- c) Describe work rest cycle in brief. [4]

- Q3)** a) Differentiate between work surface height and working height [8]
- b) Describe how is workspace envelope for standing personnel designed with ergonomics perspective [8]

OR

- Q4)** a) Discuss the various principles of seat design [8]
- b) Discuss any four principles of arranging components in physical space [8]

P.T.O.

- Q5) a)** Discuss the types of information that is processed with visual displays. **[8]**
b) Describe auditory displays? Discuss in brief. **[8]**

OR

- Q6) a)** What is C/R Ratio? How to decide optimum C/R ratio? **[8]**
b) Describe the concept of visibility **[8]**

SECTION-II

- Q7) a)** Discuss effect of noise on performance **[9]**
b) Discuss control along the path and control along receiver for noise exposure. **[9]**

OR

- Q8) a)** Discuss the physiological effect of heat on performance. **[9]**
b) Describe color systems. Also discuss the energy considerations during selection of luminaries. **[9]**

- Q9) a)** Write a note on muscle physiology. **[8]**
b) Describe the relation between heart rate and oxygen consumption. **[8]**

OR

- Q10) a)** What is VO_{2Max} . Discuss its significance with relation to HFE **[8]**
b) Discuss the design of MMH task. **[8]**

- Q11) a)** Discuss the task description and analysis in system design. **[8]**
b) What do you mean by interface design? What data is applicable in such situations **[8]**

OR

- Q12) a)** Discuss the term errors and accidents. **[8]**
b) Discuss a case in which you have come across application of human factors engineering **[8]**



Total No. of Questions : 12]

SEAT No. :

P3916

[Total No. of Pages : 2

[4859] - 139

B.E. (Production Engineering)

MATERIALS AND LOGISTICS MANAGEMENT

(Elective - II) (2008 Pattern) (Revised)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 & Q11 or Q12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain the concepts Value Analysis and Value Engineering giving example. [9]
b) What is Material Requirement Planning (MRP1)? Explain in detail. [9]
OR
- Q2)** a) What are the objectives of materials management? [9]
b) What are the factors influencing Make or Buy decision. Explain in brief.[9]
- Q3)** a) Explain Import Cycle with flowchart. [8]
b) Explain different objectives of Purchasing. [8]
OR
- Q4)** a) What are the factors to evaluate potential Supplier? [8]
b) What is Vendor development? Explain any one method of vendor rating in brief. [8]
- Q5)** a) What is store identification? Explain Brisch system of codification briefly. [8]
b) Explain waste disposal system in brief. [8]

P.T.O.

OR

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]
b) Explain and differentiate between. [8]
i) Centralized and Decentralized stores.
ii) Annual stock taking and Continuous stock taking.

SECTION - II

- Q7)** a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]
b) Explain Logistical performance cycle. [8]

OR

- Q8)** a) What is the importance of warehouse? List the types of warehouses.[8]
b) List and explain in brief economic and service benefits of warehousing.[8]

- Q9)** a) Explain various risks of supply chain management. [8]
b) Explain drivers of supply chain management in brief. [8]

OR

- Q10)**a) Define Supply Chain. Explain the importance of managing supply chain.[8]
b) Explain internal performance measures of Supply Chain Management.[8]

- Q11)**a) Define following terms related to inventory and show diagrammatically.[9]
i) Safety stock
ii) Reorder level
iii) Lead time
iv) Average inventory level
b) Explain Fixed Period (P) system and Fixed Quantity (Q) system in brief. [9]

OR

- Q12)**a) Derive the formula for EMQ when replenishment is non instantaneous (Gradual). State the assumptions made. [9]
b) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]



Total No. of Questions : 12]

SEAT No. :

P1684

[4859]-14

[Total No. of Pages : 6

B.E. (Civil Engineering)
QUANTITY SURVEYING CONTRACTS & TENDERS
(2008 Pattern) (Semester-II)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

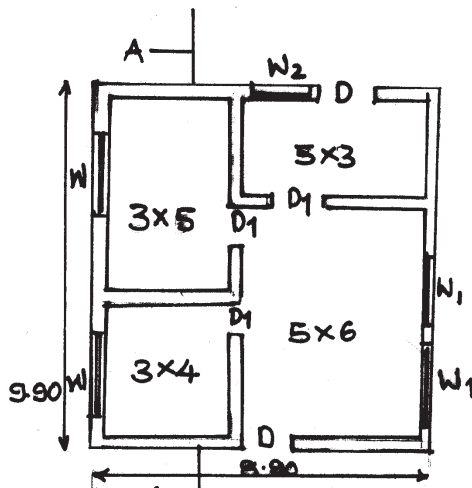
- Q1)** a) Explain the necessity of estimate. What are the different types of estimates? Explain preliminary & detailed estimate. **[6]**
- b) Prepare a preliminary estimate for a school building of 1000 students. The following details may be used for estimation: **[6]**
- i) Carpet area = 1.2 m² per student,
 - ii) 20% of plinth area for corridor, verandah, lavateries,
 - iii) 15% for walls
 - iv) Water supply at 5% & sanitation 6% of building cost
 - v) Electrification at 10% of building cost
 - vi) Cost of approach road & boundary wall at 3% of building cost
 - vii) Contingency & workcharge establishment at $7\frac{1}{2}\%$ of total cost.
Assume plinth area rate of Rs. 2000 m².
- c) Explain in brief method of preparing approximate estimate for an irrigation project. **[6]**

OR

P.T.O.

Q2) a) Work out the quantities of the following item of work by PWD method & compare it by centre line method fig (i) in plan [16]

- i) Earthwork excavation for foundation.
- ii) Brick masonry in cm 1:6 for superstructure.
- iii) Internal plastering 12 mm thick in cm 1:6.
- iv) R.C.C. Lintel.



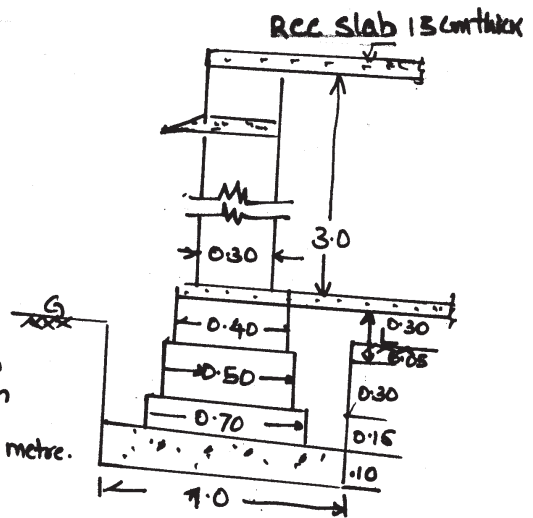
Q. NO 2(a) fig(i)
Plan.

Doors
 $D = 0.90 \times 2.10$
 $D_1 = 0.75 \times 2.10$

Window
 $W = 1.20 \times 1.50$
 $W_1 = 0.90 \times 1.50$

Depth of Excavation
 $= 0.60\text{m}$

All Dimension in metre.



fig(i) Section along AA

b) Give unit of measurement of Any 2 of the following: [2]

- i) Frame work of Doors & window.
- ii) Damp proof course.
- iii) External plastering.

Q3) a) Estimate the quantity of earthwork for an approach road to be constructed in cutting & filling.

Chainage	0.00	30	60	90	120	150	180
Ground level (m)	80.50	80.00	79.2	80.50	81.00	80.50	81.00

Assume formation level at chainage 0.00 81.00 m & formation width of 10 m. Side slope 1V to 2H in filling & 1V to 1H in cutting. [10]

- b) An hospital building is to be provided with a brick wall constructed in CM 1:6. The length of wall is 75m, height above plinth = 2.4m, thickness of wall = 30 cm, find:
- Quantity of material required.
 - If 4 mason & 12 mazdoor are required for construction find the time in days for completion of work. [6]

OR

- Q4)** a) Explain the need for preparing bar bending schedule. Prepare a typical bar bending schedule for an RCC roof slab. [8]
- b) What is development length & explain development length in tension & compression? Explain how length of bent up bars are workedout. [4]
- c) Explain how & why contingences & work charge establishment are added, while preparing a detailed estimate. [4]

- Q5)** a) What is the necessity of writing specification of item in construction? Explain method of preparing specification. [4]
- b) Prepare the detailed specification for RCC works in slab & beam. [8]
- c) Explain detailed specification & what are the details to be included in the detailed specification. [4]

OR

- Q6)** a) What is task work? Why does it vary? Explain its importance with an example. [4]
- b) Discuss the various factors affecting rate of any item of work. [4]
- c) Prepare Rate Analysis for REC works in column in C.C 1: 1.5:3 using coarse sand, 20mm size ballast, cement necessary centering, T & P may be assumed.

For materials and labour, assume local rates. [8]

SECTION-II

- Q7) a)** Explain the following with reference to purpose of valuation: [6]
- i) Betterment charges
 - ii) Taxation
 - iii) Insurance.
- b) A vacant plot of size $40\text{m} \times 67.5\text{m}$ has shorter side adjoining a road. Knowing that average land cost in the locality is Rs. 600/- per square meter, determine total cost of the plot using method of belting. Assume three belts. [6]
- c) A small temporary construction on the site has total cost of 12,000 rupees. Assuming salvage value at the end of 6 years to be 3,000 rupees, calculate depreciation and book value for each year. Use straight line method of depreciation. Give answer in usual tabular form. [6]

OR

- Q8) a)** With appropriate examples briefly explain: [6]
- i) Accommodation value.
 - ii) Speculative value.
 - iii) Distress value.
- b) An old building is purchased for Rs. 1,00,000/- excluding land cost. Using rate of compound interest for sinking fund as 5%, determine the amount of annual sinking fund. Assume future life of building 30 years and scrap value 10% of the cost of purchase. [6]
- c) A freehold property consists of a 600 m^2 plot with a 3-storeyed building over it. Find total value of the property using following data: [6]
- Built-up area on ground floor = 180 m^2
 - Total carpet area (on 3 floors) = 250 m^2
 - Expected future life of building = perpetuity
 - Rate of land = Rs. 40/- per m^2 (for vacant land)

- Average net rent = Rs. 4/- per m² of the carpet area
- Permissible built up area on ground floor = $\frac{1}{3}$ of plot area
- Rate of interest on capital = 7%
- Total outgoings = $\frac{1}{6}$ of the gross rent.

Q9) a) State the methods adopted by P.W.D. for execution of works clearly explain the following with examples: [5]

- Administrative approval.
 - Technical sanction.
- b) If Government does not have sufficient funds for public works, what is the solution for executing such works? Discuss clearly the pro and cons. [5]
- c) Briefly explain important contents of 'FIDIC Document'. [6]

OR

Q10) a) Discuss meaning and necessity of 'pre-tender conference'. [5]

- Explain the terms 'revocation of tender' and 'unbalanced tender'. [5]
- Explain submission, opening and scrutiny of tenders under 'four envelope system'. [6]

Q11) a) Discuss advantages and disadvantages of pre-qualification of contractors. [5]

- Explain qualifications, duties and powers of an arbitrator. [5]
- State whether True or False with proper reasons (justification). No marks will be given if reason is not mentioned. [6]
 - Earnest money may be submitted in the form of bank guarantee with the banks specified by the owner.

- ii) Escalation of price variation clause can not be the part of a valid contract.
- iii) Defect liability period is generally 3 to 5 years after work completion.

OR

- Q12)**a) In how many ways a contract can be terminated? Discuss termination of contract by impossibility of performance. [5]
- b) Discuss merits and demerits of item-rate contract with appropriate examples. [5]
- c) State whether true or false, giving proper reasons (no marks will be given if reason or justification is not stated). [6]
- i) Security deposit consists of performance guarantee and retention money.
 - ii) Owner or contractor may put up the matter of theft of material from the site for arbitration if the thief is caught red handed.
 - iii) Compliance of relevant laws, acts by the contractor should not be a part of conditions of contract.



Total No. of Questions : 12]

SEAT No. :

P1770

[4859]-140

[Total No. of Pages :3

B.E. (Production Engineering)
c:SIMULATION AND MODELING
(2008 Course) (Semester-I) (411085) (Elective-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.*

SECTION-I

Q1) a) Explain basic principles of simulation modeling. **[8]**

b) Discuss role of statistics in simulation modeling. **[8]**

OR

Q2) a) Explain with suitable example the events and activities associated with part manufactured on shop floor. **[10]**

b) Discuss the advantages of simulation. **[6]**

Q3) a) Discuss the applications of simulation in inventory management. **[8]**

b) Define-Physical, Mathematical, Static and Dynamic simulation models.**[8]**

OR

P.T.O.

- Q4)** a) Discuss deterministic vs. Stochastic with suitable example. [8]
- b) A confectioner sells the confectionery items. Past data of demand per week in tones with frequency is [8]

Demand/week	0	5	10	15	20	25
Frequency	2	11	8	21	5	3

Using the following sequence of random number generates the demand for next 15 weeks. Also find out the average demand per week. Use the random number:35, 52, 90, 13, 23, 73, 34, 83, 94, 57, 35, 56, 67, 66, 60.

- Q5)** a) Explain different methods for data collection for analysis. [10]
- b) Discuss use of random numbers in simulation with example. [8]

OR

- Q6)** a) Discuss the methods for selecting families of input distributions when input data available. [10]
- b) Explain different test carried out for data analysis. [8]

SECTION-II

- Q7)** a) Discuss the inverse transformation technique to sample from the exponential distribution. [8]
- b) Explain Exponential and Weibull distribution and its properties. [8]

OR

- Q8)** a) Discuss exponential and normal distribution with application. [8]
- b) Describe termination and non terminating simulation. [8]

- Q9)** a) Discuss about a simulation of a batch manufacturing shop. [9]
- b) Discuss about a simulation of a flexible manufacturing cell. [9]

OR

Q10)a) Discuss the factors to be considered for simulation of manufacturing system. [8]

b) Discuss performance measures used in manufacturing systems. [10]

Q11)a) Explain in detail important feature of Promodel simulation software. [8]

b) Compare simulated factory with nonsimulated factory with certain major points. [8]

OR

Q12)a) Comments on simulation languages. [8]

b) Write comparison of simulation software with programming languages. [8]



Total No. of Questions : 12]

SEAT No. :

P4435

[Total No. of Pages : 3

[4859] - 141

B.E. (Production)

PLANT ENGINEERING AND MAINTENANCE

(2008 Pattern) (Elective - II (d))

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :-

- 1) Answer three questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Figures to the right indicate full marks.*

SECTION - I

- Q1) a)** Explain in short various plant maintenance functions ? **[8]**
- b) Explain in short work routine maintenance, emergency work and preventive maintenance. **[8]**

OR

- Q2) a)** Why assessment of maintenance is important for successful working of the maintenance function? Discuss briefly. **[8]**
- b) Write short notes on: **[8]**
- i) Performance and productivity measurement.
 - ii) Manpower planning for maintenance.
- Q3) a)** What factors should be considered while designing a factory building? Will you prefer 'L' shaped building over rectangular building for a new plant? Why? **[10]**
- b) Explain in short Layout generation using REL chart. **[8]**

P.T.O.

OR

Q4) a) Write short notes on: [10]

i) Group Technology

ii) Mather's plant layout procedure

b) What are the different techniques in layout planning. [8]

Q5) a) Discuss the factors which need to be considered for implementation of an efficient spare parts control system? [8]

b) Explain how computers can be helpful in discharge of maintenance function. [8]

OR

Q6) a) How does condition based monitoring influence the maintenance activity function? Explain. [8]

b) Explain the following type of maintenance in short. [8]

i) Breakdown maintenance.

ii) Condition based maintenance as predictive preventive maintenance.

SECTION - II

Q7) a) Discuss various distribution function used for the estimation of reliability in the performance of the maintenance function. [8]

b) Briefly explain the concept of life cycle costing of equipment. [8]

OR

Q8) a) Discuss the benefits that accrue from periodic preventive management? [8]

b) Explain how reliability data helps in performance of the maintenance function. [8]

- Q9)** a) Briefly explain two disposal methods of solid waste. [8]
- b) Write short notes on: [10]
- i) Recycling of waste.
 - ii) Energy conservation, management and audit.

OR

- Q10)**a) Explain in short various fire protection and prevention practices. [10]
- b) State any three advantages and any three applications of the following transport equipment. [8]
- i) Cranes
 - ii) Conveyors
 - iii) Industrial Truck

- Q11)**a) How does condition monitoring influence the maintenance activity function? Explain. [8]
- b) Write short notes on: [8]
- i) Tero Technology
 - ii) RAM analysis

OR

- Q12)**a) Differentiate betⁿ the spectrometric oil analysis procedure and the magnetic plug inspection system. [8]
- b) Explain in short Reliability centered maintenance. [8]

XXXX

Total No. of Questions : 12]

SEAT No. :

P1771

[4859]-142

[Total No. of Pages :5

B.E. (Production Engineering)
COMPUTER INTEGRATED DESIGN AND MANUFACTURING
(2008 Pattern) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1) a)** A ΔPQR with vertices $P(2,4), Q(10,8), R(4,12)$ is to be reflected about the line of its edge QR . Determine the co-ordinate of vertices for a reflected triangle. [8]
- b) Explain the procedure to obtain the surfaces of revolution. [8]

OR

- Q2) a)** If $B_0(2,4), B_1(4,2), B_2(7,8), B_3(8,5)$ are the vertices of a bezier polygon, determine points on the curve for parameter value, 't' = 0.6. [8]
- b) Determine the transformed vertex positions of a ΔPQR having co-ordinates $P(8,6), Q(2,12)$ and $R(5,3)$ when it is rotated by 60° anticlockwise about the vertex Q . [8]

- Q3) a)** For the truss structure shown in Fig.1 determine stress in each element. [12]

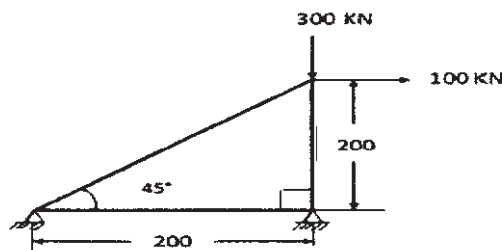


Fig. 1

For all members: $E=2 \times 10^5$ MPa, Area = 1000 mm²

- b) What is boundary value problem? Provide its mathematical formulation and state any two examples. [4]

OR

P.T.O.

- Q4) a)** By using FEA for a bar shown in Fig.2. Determine nodal displacements, element stresses and reactions forces. [8]

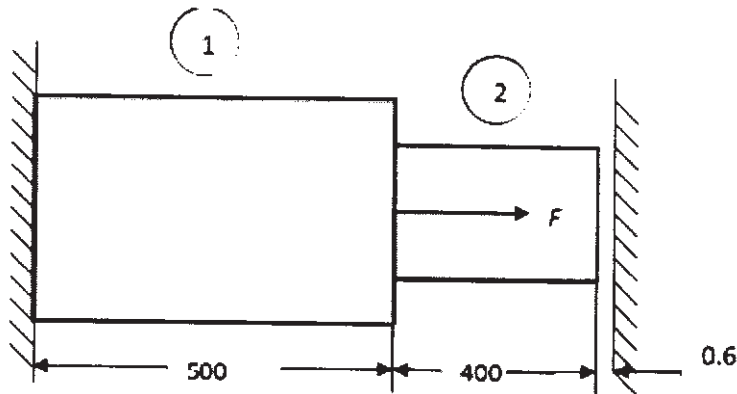


Fig. 2

Given that: $A_1=600 \text{ mm}^2$, $A_2=350 \text{ mm}^2$, $E(\text{for all})=2 \times 10^5 \text{ MPa}$, $F=100 \text{ KN}$

- b) The left surface of a plane wall of total thickness 0.12 m is maintained at temperature of 50°C and the right surface is exposed to ambient temperature of 10°C . If the heat transfer coefficient is $30 \text{ W}/(\text{m}^2 \cdot ^\circ\text{C})$ and the thermal conductivity is $0.01 \text{ W}/(\text{m} \cdot ^\circ\text{C})$, calculate the nodal temperatures considering uniform mesh of two linear finite elements. Assume area = 1 m^2 for both elements. [8]

- Q5) a)** Prepare the part program for the component shown in Fig.3 to be machined on CNC turning center. [12]

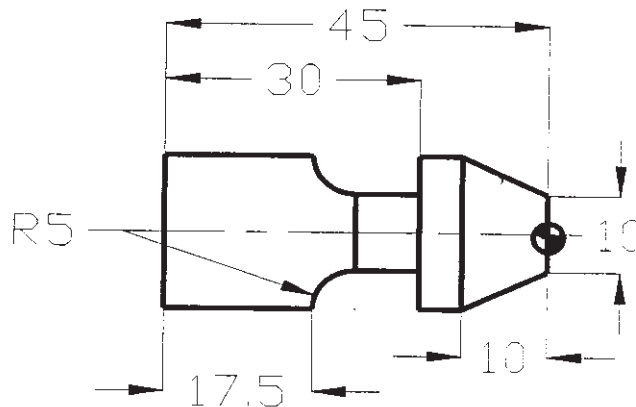


Fig. 3

- b) Explain with suitable example application of 'Do Loop' in CNC programming. [6]

OR

- Q6) a)** Prepare the part program for component shown in Fig.4 to be machined on CNC machining center. Assume Xo/Yo at the center of part. [12]

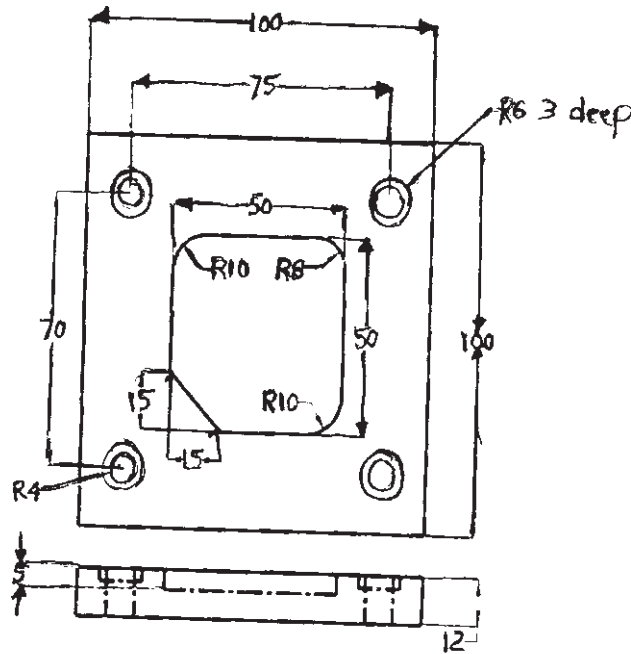


Fig. 4

- b) Explain:** [6]
- i) Cutter radius compensation
 - ii) Tool length offset

SECTION - II

- Q7) a)** Discuss MRP I and MRP II in modern manufacturing system with sketch. [8]
- b)** What is concurrent engineering? Explain its differences from sequential engineering with a block diagram. [8]

OR

- Q8) a)** Explain the various phases of ERP implementation. [8]
- b)** Explain in relation to robot textual programming languages [8]
- i) Motion programming and ii) Interlock and sensor commands.

Q9) a) Explain with suitable example how production flow analysis helps in cell formation in grouping of parts. **[8]**

b) A part machine incidence matrix is given below. Apply ROC to obtain logical machine groups and corresponding part families. **[10]**

Parts → Machines ↓	1	2	3	4	5	6	7	8
A	0	1	0	1	0	1	1	0
B	1	0	0	0	1	0	1	1
C	1	0	0	0	1	0	1	1
D	0	0	0	0	0	0	0	1
E	0	0	1	1	0	1	0	0
F	0	1	1	1	0	1	0	0
G	1	0	0	0	0	0	0	1

OR

Q10)a) What is flexible manufacturing system (FMS)? Explain the classification of FMS based on a) Number of Machines b) Level of flexibility and c) Types of layout. **[8]**

b) Determine most logical sequence for data according to, From/To ratio, construct flow diagram, develop a feasible layout for cell where the part enter and exists the cell. **[10]**

To → From ↓	1	2	3	4	5
1	0	20	90	0	0
2	0	0	0	95	0
3	0	0	0	0	0
4	80	0	30	0	0
5	0	85	0	30	0

- Q11)a)** Explain with neat sketch in detail the ESPRIT CIM-OSA model. [8]
- b) Explain with neat sketch Solid Ground Curing Method of additive manufacturing. [8]

OR

- Q12)a)** Explain with flow chart the NIST-AMRF hierarchical model. [8]
- b) What is 3D printing? Discuss the process along with its advantages and limitations. [8]



Total No. of Questions : 12]

SEAT No. :

P1772

[4859]-143

[Total No. of Pages :4

**B.E. (Production Engineering)
PROCESS PLANNING AND TOOL SELECTION
(2008 Course) (Semester-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.*

SECTION-I

- Q1)** a) “Process planner often becomes a ‘sorter’, ‘selector’ and ‘final judge’ in choosing the best overall plan” -Comment. [8]
- b) What are main in-puts and out-puts of manufacturing systems? What are main elements of it? [8]

OR

- Q2)** a) “Process Engineering is the hub of the organization”, Discuss with the help of a material flow in an organization. [8]
- b) What information a product engineer must transmit to process planner in order to continue his work? [8]

- Q3)** a) What key points should be considered in determining the nature of work to be performed on the work-piece. [8]
- b) What is a datum? What is the advantage of using a datum? Is it always possible to establish a physical datum? Explain with example. [8]

OR

P.T.O.

- Q4) a)** How to determine the areas suitable for locating, holding and processing? [8]
b) Mention the geometric characteristics of a surface? What is Lay? Sketch the symbols related to common direction of lay. [8]

- Q5) a)** What is the purpose of tolerance chart? Explain the rule for adding and subtracting the dimensions. Explain with suitable example. [9]
b) Convert the following to dimensions with equal bilateral tolerances. [9]

i) $5.250^{+0.010}_{-0.000}$

ii) $1.500^{+0.008}_{-0.001}$

iii) $3.750^{+0.002}_{-0.005}$

Use tolerance conversion chart as shown in Fig.1

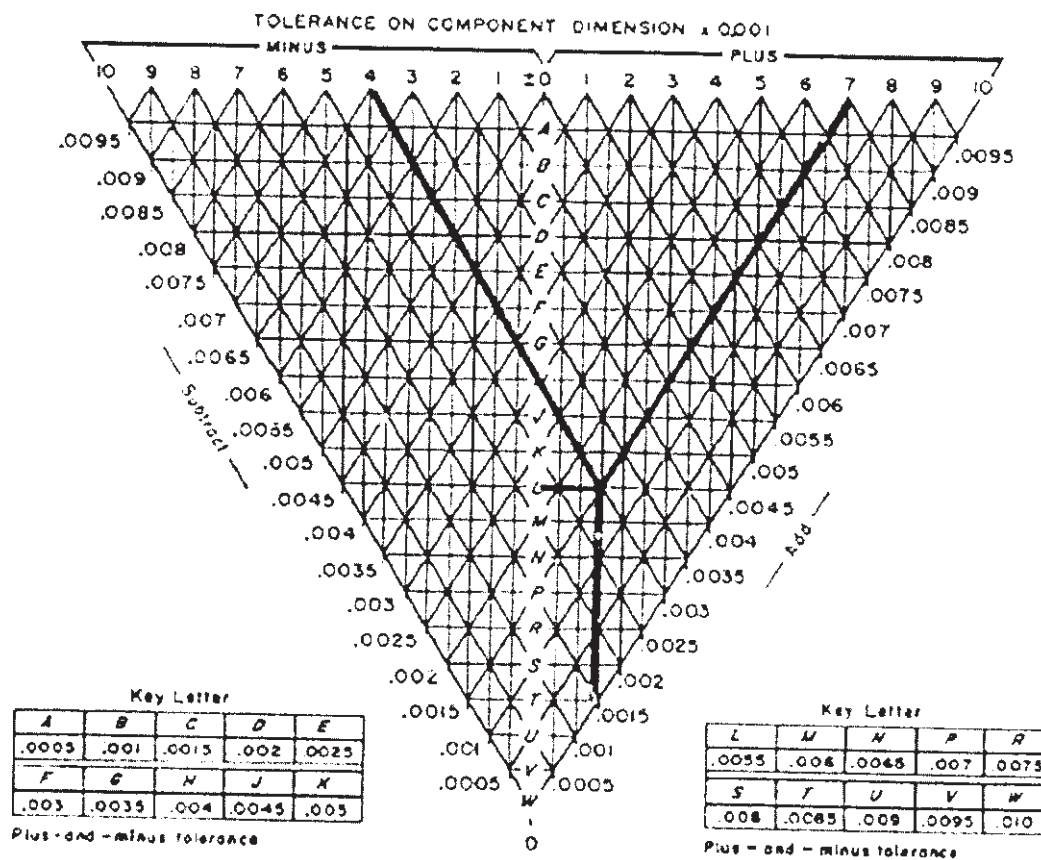


Fig. 1. Tolerance conversion chart

OR

- Q6)** a) What are the variables which interfere with work-piece control? Sketch the use of supports to control deflection on the work-piece. [9]
- b) Explain with neat sketches geometric control for:- [9]
- i) Long cylinders
 - ii) Short cylinders
 - iii) Conical shapes.

SECTION - II

- Q7)** a) Describe the steps of the engineering approach to selecting and planning a process. [8]
- b) What are the advantages of using commercial tooling over Regular and special tooling? What should be the order of procurement of tools? [8]

OR

- Q8)** a) What sources of information usually available to the process engineer to assist him making a machine selection? Give detailed specifications of any one machine of your choice. [8]
- b) What is a tool inserts and how it is used? What are the benefits of using inserts over solid tools? What type of inserts available in market? [8]

- Q9)** a) Explain simulation and integration of operations. What generally gained by combining operations? What are its disadvantages? [8]
- b) Explain Automatic time standard system (ATS) in CAPP [8]

OR

- Q10)**a) What are steps in generative computer aided process planning system? Explain with a neat flow chart. [8]
- b) Explain the difference between product critical areas and process critical areas with a sketch. [8]
- Q11)**a) Sketch the symbols used for locators, clamps, supports and combination of these items. [6]

- b) What is operation routing? What information it includes? [6]
- c) What information does the process picture provide? Name some operations which do not require process picture. [6]

OR

Q12) Prepare a process sheet to machine a component as shown in figure 1. Total number of components are to be manufacture are 350 in 15 days. The process sheet must contain manufacturing plan with operation sequence, equipments, tooling, process parameters and sample calculation of operation time etc. All dimensions are in mm. General Tolerance ± 0.1 . [18]

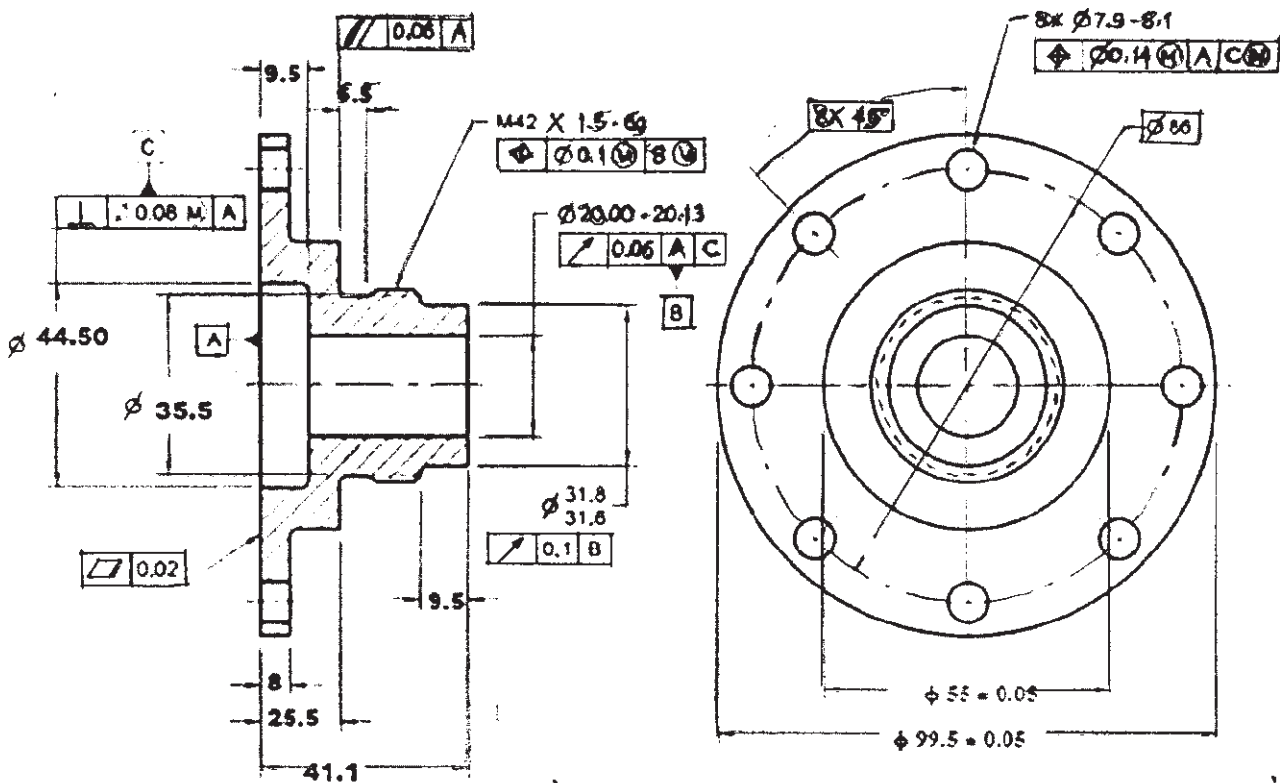


Fig. 1



Total No. of Questions : 12]

SEAT No. :

P1773

[4859]-145

[Total No. of Pages :3

**B.E. (Production)
b-MECHATRONICS
(2008 Pattern) (Elective-III) (Semester-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*

SECTION-I

- Q1)** a) Describe with neat sketch overall PLC system. [8]
b) Compare PLC's with other types of controllers. [8]

OR

- Q2)** a) Explain in short the programming devices used in PLC programming. [8]
b) Explain with neat sketches memory types in PLC controllers. [8]

- Q3)** a) Multi-bit register/BCD output interfaces provide parallel communication between the processor and an output device, explain with neat sketch. [8]
b) Common error-checking techniques include parity and checksum. Discuss in short. [8]

OR

- Q4)** a) What are remote I/O systems? Explain with neat sketches daisy chain, star, and multi-drop configurations. [8]
b) Write in short about any two Mechanical and electrical specifications of PLC. [8]

P.T.O.

- Q5) a)** Explain with neat sketch transformation of analog signal into discrete form. [8]
- b) Explain the analog input block in PLC ladder programming with details of each parameter. [10]

OR

- Q6) a)** Explain why analog output bypass is required and how it is done? [8]
- b) An input module, which is connected to a temperature transducer, has an A/D with a 12-bit resolution. When the temperature transducer receives a valid signal from the process (1 to 200°C), it provides, via a transmitter, a +1 to +5 VDC signal compatible with the analog input module. (a) Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts, and (b) Find the same values of a module with a 10-bit resolution. [10]

SECTION - II

- Q7) a)** Explain with neat sketches fast-input/pulse stretcher module and wire input fault module. [8]
- b) What are positioning interfaces? Explain with neat sketch PLC system using stepper modules to control three axes. [8]

OR

- Q8) a)** Describe Thermocouple input interface with neat sketch. [8]
- b) Explain one-shot output instruction and transitional contact instruction. [8]

- Q9) a)** Write any four ladder relay instructions with associated symbol and functions. [8]
- b) Explain with ladder instruction ON-delay energize timer and ON-delay de-energize timer instructions. [8]

OR

Q10)a) With a suitable illustration explain the Boolean language used in PLC to program a controller. [8]

b) Write in short about any two arithmetic instructions used in PLC programming. [8]

Q11)a) Bridge circuits use resistive elements to sense measurement changes. Explain with suitable examples. [9]

b) Explain with neat sketch principle of working of LVDT. [9]

OR

Q12)a) What are thermistors? Explain in short its types. [9]

b) Write a short note on Accelerometers. [9]



Total No. of Questions :12]
P1774

SEAT No. :
[Total No. of Pages :3

[4859]-146
B.E.(Production)
c-METAL WORKING TRIBOLOGY
(2008 Course)(Elective III) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain with an application “ Contact theory of surface.” [6]
b) Explain Abbot’s bearing area curve [10]

OR

- Q2)** a) How do you characterize a surface. [6]
b) Differentiate between “Periodicity and Stationary” of a surface. [10]

- Q3)** a) What are the sliding friction mechanisms? [8]
b) Derive a modified Bowden and Tabor friction equation. [10]

OR

- Q4)** a) Explain laws of friction with example. [8]
b) Dervie friction equation involving hard material [10]

- Q5)** a) Derive Theories of Wear. [6]
b) Explain Mechanical and dynamic seals. [10]

OR

P.T.O.

- Q6)** a) Explain lubrication used for rolling and give applications for the process used in rolling. [10]
b) Describe “Erosive Wear” with a desired application [6]

SECTION- II

- Q7)** a) Explain “Dry friction” lubrication with application [4]
b) Describe different methods to measure “Viscosity” [4]
c) Explain different modes of lubrication. [8]

OR

- Q8)** a) Explain with a neat sketch “liquid friction”. [12]
b) What are the properties required in lubricants? [4]

- Q9)** a) Explain Radial journal bearing under hydrodynamic condition including Reynolds’s equation. [12]
b) Describe concept of “Bearing power”. [6]

OR

- Q10)**a) What is Elasto - hydrodynamic (modified Reynolds equation)? Explain. [10]
b) How to control “bearing temperature”? Explain. [8]

- Q11)**a) Derive an equation for two circular plates approaching each other involving squeeze film operation. [10]
b) Two circular plates of 125mm \square approaching each other with velocity of 12.5 cm/s in liquid of $\mu=0.035$ Pas. Find out pressure, load and time for film thickness to come down from 0.25mm to 0.005mm. [6]

OR

- Q12)a)** Derive squeeze film equation for rectangular plate approaching a rigid surface. **[10]**
- b) Write short notes on : **[6]**
- i) tyre - road tribology.
 - ii) Applications of “squeeze film lubrication.”



[4859]-147
B.E. (Production)
FINITE ELEMENT ANALYSIS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

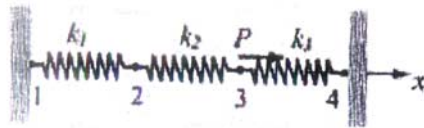
Instructions to the candidates:

- 1) Answer three questions from Section I and three questions from Section II.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assumptions made should be clearly stated and justified.

SECTION - I

Q1) a) Explain the concept of FEM briefly and outline the procedure.

b)



Given : For the spring system shown above,
 $k_1 = 100 \text{ N/mm}$, $k_2 = 200 \text{ N/mm}$, $k_3 = 100 \text{ N/mm}$
 $P = 500 \text{ N}$, $u_1 = u_4 = 0$

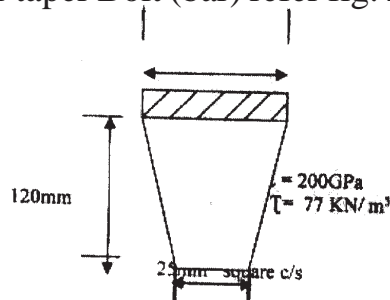
- Find :
- a) the global stiffness matrix
 - b) displacements of nodes 2 and 3
 - c) the reaction forces at nodes 1 and 4
 - d) the force in the spring 2

[16]

OR

Q2) a) Derive stiffness matrix and load vector using potential energy approach.

b) Find the deflection at free end under its own weight using 1,2, 3 elements for taper Bolt (bar) refer fig. 2. 100mm.



[16]

P.T.O.

Q3) a) Explain the concept of Local and Global co-ordinate system with respect to truss element. [8]

b) [8]

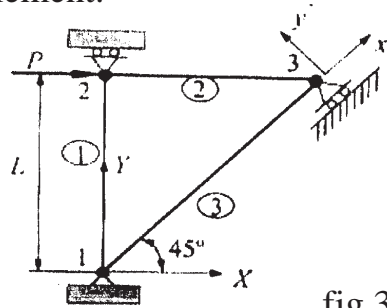


fig.3

For the plane truss shown above,

$P = 1000 \text{ kN}$, $L = 1 \text{ m}$, $E = 210 \text{ GPa}$,

$A = 6.0 \times 10^{-4} \text{ m}^2$ for elements 1 and 2

$A = 6\sqrt{2} \times 10^{-4} \text{ m}^2$ for element 3.

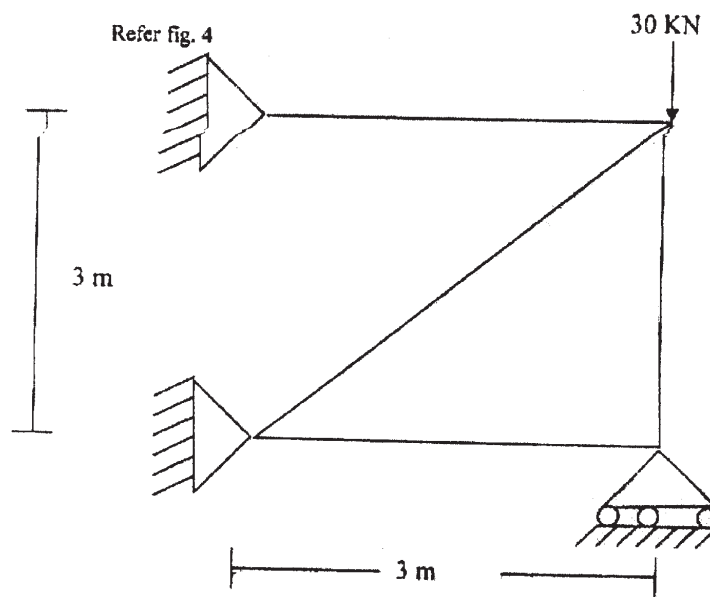
Determine the displacements and reaction forces.

OR

Q4) a) Explain the assembly of global stiffness matrix for the banded and skyline solutions. [8]

b) Consider a four bar truss as shown. It is given that $E = 200 \times 10^9 \text{ N/m}^2$ and $A = 500 \text{ m}^2$. [8]

- Determine the element stiffness matrices for each element.
- Assemble the structural stiffness matrix 'K' for entire truss.
- Using the elimination approach, Solve for the nodal displacement. Calculate the reaction forces.



- Q5)** a) Briefly discuss Iso-parametric representation. [6]
- b) Fig. 5 shows an indeterminate pin connected plane stress with cross of Diagonal members equal to 2000 mm^2 and all other members with cross sectional area of 1000 mm^2 . If Young's modulus $E = 200 \text{ kN/mm}^2$ [12]
- Assemble global stiffness matrix
 - Determine load vector if temperature of member 1-3 increases by 25°C . Given $\alpha = 12 \times 10^{-6}/^\circ\text{C}$
 - Determine load vector if member 1-3 is longer by 0.2 mm .
 - Introduce Boundary conditions.

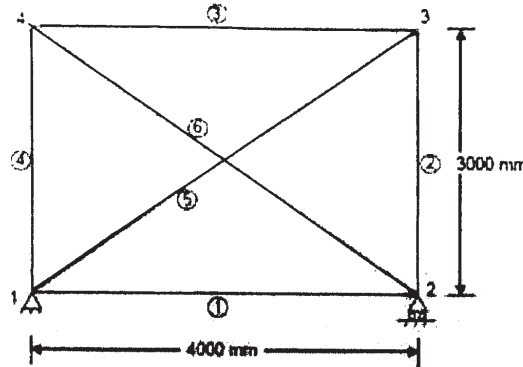
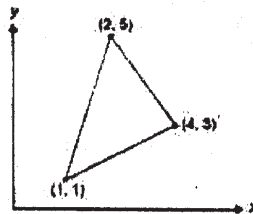


Fig.5

OR

- Q6)** a) Discuss problem modeling. [6]
- b) For a CST element shown in Fig. 6.4, Obtain the strain-displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant. [12]



- Derive stiffness matrix for a CST element by direct approach.
- Differentiate between the terms 'lumped loads' and consistent loads.

SECTION - II

- Q7)** a) Derive the equation of four-Node Quadrilateral for axisymmetric problems. [4]
- b) The thermal conductivity of a stainless steel rod of 0.1 m length and area of cross section of 1 cm^2 is $20 \text{ W/m}^\circ\text{C}$. The rate of heat generation in the rod is 10^5 W/m^3 . One end of the rod is kept at 0°C and the other end at 100°C . The rod is insulated except at the ends. Using finite element with two elements, find out the temperature at the mid-point of the rod. Also, find out the heat flow at the ends of the rod using FEM. Compare the results with the exact solution. [12]

OR

- Q8) a) Give the finite element modeling of the triangular element. [4]
 b) The thin plate of uniform thickness 20 mm is as shown in Fig. 7 in addition to the self weight, the plate is subjected to a point load of 400N at mid-depth. The Young's Modulus $E = 2 \times 10^5 \text{ N/mm}^2$ and unit weight $\rho = 0.8 \times 10^{-4} \text{ N/mm}^2$. Analyze the plate after modeling it with two elements and find the stresses in each element. Determine the support reactions also. [12]

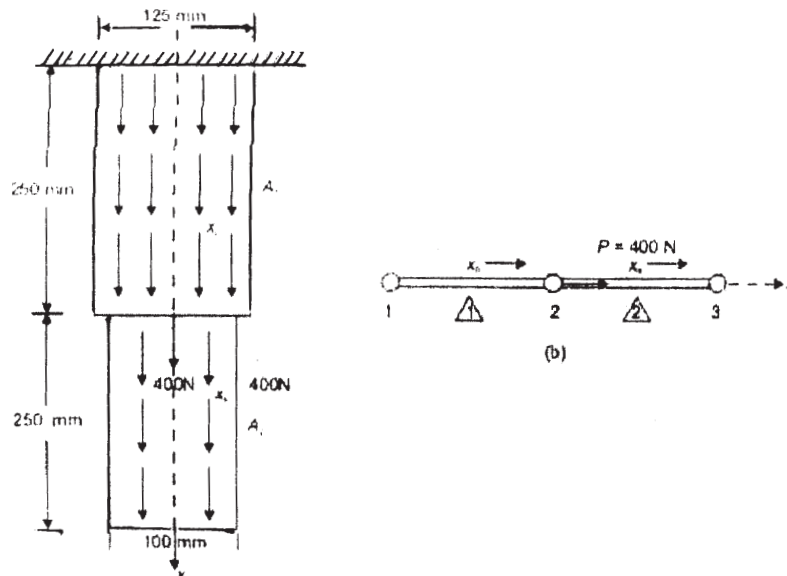
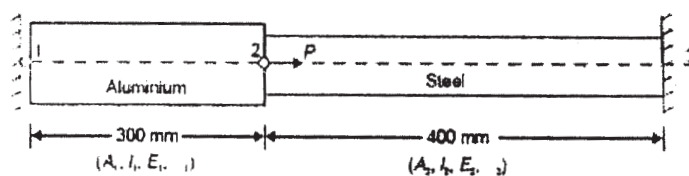


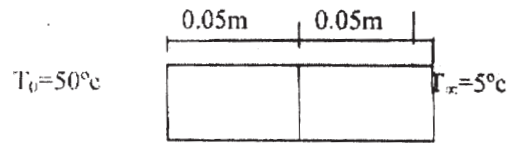
Fig.7

- Q9) a) Give the governing differential equation for steady state heat transfer - 1D & 2D heat condition & convection. [4]
 b) Determine the nodal displacement at node 2, stresses in each material and support reactions in the bar shown in fig. 1 due to applied force $P = 400 \times 10^3 \text{ N}$ and temperature rise of 30°C . Given : $A_1 = 2400 \text{ mm}^2$, $A_2 = 1200 \text{ mm}^2$, $E_1 = 0.7 \times 10^5 \text{ N/mm}^2$, $E_2 = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha_1 = 22 \times 10^{-6} / ^\circ\text{C}$, $\alpha_2 = 12 \times 10^{-6} / ^\circ\text{C}$, $E = 200 \times 10^5 \text{ N/cm}^2$ [12]



OR

- Q10)** a) Explain Galerkin's approach for heat conduction. [4]
b) Determine the temperature distribution in the wall and the heat input at left surface of the wall $L=0.1\text{m}$, $k= 0.01 \text{ w/m}^\circ\text{C}$, $\beta = 25 \text{ w/m}^2^\circ\text{C}$. Solve for nodal temperatures. [12]



- Q11)** Write short notes on : [18]
a) Mesh generation.
b) FEA packages.
c) Boundary conditions.
d) Quality checks.

OR

- Q12)** Make a flow chart of FEM program for solving the plane stress problem, it should have a provision for adaptively refining the mesh based on the error analysis. [18]



Total No. of Questions : 12]

SEAT No. :

P3174

[Total No. of Pages : 2

[4859]-148

B.E. (Production)

**WORLD CLASS MANUFACTURING
(2008 Pattern) (Elective - IV) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain manufacturing excellence. Explain its significance. [8]
b) Discuss in detail Schonberger's WCM model. [8]

OR

- Q2)** a) Explain features of Hall's WCM model. [8]
b) Discuss Gunn's WCM model? [8]

- Q3)** a) Explain ways of eliminate wastages from manufacturing. [8]
b) Discuss bench marking in detail. [8]

OR

- Q4)** a) Explain importance of value stream mapping. [8]
b) Discuss with best practices of any one manufacturing plant. [8]

- Q5)** a) Explain FMS systems from WCM. [8]
b) Discuss Total Productive Maintenance. [10]

OR

P.T.O.

- Q6)** Write short notes on following : **[18]**
- a) 5S
 - b) Poka Yoke
 - c) JIT production system

SECTION - II

- Q7)** a) Discuss training component of WCM organization. **[8]**
b) What are good practices of HR department in WCM organization. **[8]**

OR

- Q8)** a) What are various ways are used to motivate the people in WCM organization? **[8]**
b) Discuss “people are used as problem solver in WCM”. **[8]**

- Q9)** a) Write TOPP system of WCM performance. **[8]**
b) Explain AMBIT tool of performance measurement. **[8]**

OR

- Q10)** a) Explain features of modern performance system. **[8]**
b) What is POP system? **[8]**

- Q11)** a) Explain any one case study of Indian company related to WCM. **[8]**
b) Discuss green manufacturing. **[10]**

OR

- Q12)** a) Explain agile manufacturing. **[8]**
b) Discuss with example clean manufacturing system. **[10]**



Total No. of Questions : 12]

SEAT No. :

P3175

[Total No. of Pages : 3

[4859]-149

B.E. (PRODUCTION ENGINEERING) (2008 Pattern)

Intelligent Manufacturing Systems

(Elective-IV)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answer any one question from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Electronic Pocket Calculator is allowed.*
- 6) *Assume Suitable data, if necessary.*

SECTION-I

- Q1)** a) Discuss the role of CAD / CAM systems in the manufacturing facility. Describe briefly the CAM cycle in a feature-based design environment. [9]
- b) What are the differences between a fixed automation system and a flexible manufacturing system? Under what circumstances would each of these types of systems be most appropriate? [9]

OR

- Q2)** a) What is the purpose of process planning? Why is Computer Aided Process Planning (CAPP) useful in manufacturing? Discuss some of the benefits of CAPP. [10]
- b) Define CIM and its components. Explain how it can be implemented in the automation of the production organization. [8]

OR

- Q3)** a) Develop a taxonomy of the pioneering works in artificial intelligence and expert systems? [8]
- b) Describe the system architecture of an intelligent manufacturing system? [8]
- Q4)** a) Define 'Artificial Intelligence'? List with reasons the ten most important manufacturing problems suitable for expert system applications? [8]
- b) Discuss the differences between knowledge and ignorance with respect to artificial intelligence applications? Propose a set of criteria that must be met for machine or software to be considered intelligent? [8]

P.T.O.

- Q5)** a) Discuss the basic differences between a knowledge base and a data base? Why is the user interface an important consideration in expert system? [8]
- b) Engineering problem solving often involves developing a general solution model with liberal tolerance specifications. Does this approach enhance or impede expert systems applications to engineering problems? Explain? [8]

OR

- Q6)** a) Why is it important to restrict an expert system implementation to a narrow problem domain. Justify the reason with an example? [8]
- b) Explain the following with an example [8]
- i) Inductive and deductive reasoning
 - ii) Breadth - First search
 - iii) Depth - First search

SECTION-II

- Q7)** a) Discuss the differences between knowledge elicitation, knowledge extraction and knowledge acquisition? [8]
- b) What is 'Machine Learning'? Explain with an example how Neural Networks are useful in Machine Learning? [10]

OR

- Q8)** a) What is an artificial neuron? Discuss the basic equation associated with a neuron? [9]
- b) Explain how the fuzzy logic theory is useful in machine thinking? [9]

- Q9)** a) What are the decisive factors for applying the group technology concept in automated manufacturing system? Explain [8]
- b) What is Knowledge Based Group Technology (KBGT)? Explain with a neat diagram the structure of KBGT? [8]

OR

- Q10)**a) Discuss in detail the classification and cluster analysis approaches to Group Technology? [8]
- b) What are the typical constraints in the group technology problem in automated manufacturing systems? [8]

Q11) a) Develop a work breakdown structure for the installation of an expert system for engineering design? [8]

b) What are the organizational problems that can evolve from the rapid introduction of expert systems technology? [8]

OR

Q12) Explain the role of Artificial Intelligence in the following areas: [16]

a) Job Scheduling

b) Facility Planning



Total No. of Questions : 12]

SEAT No. :

P1685

[4859]-15

[Total No. of Pages : 4

B.E. (Civil)

TRANSPORTATION ENGINEERING-II

(2008 Course) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 for Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

SECTION-I

- Q1)** a) State comparison between First Road Development Plan and second Road Development Plan. **[4]**
- b) The area of a certain district in India is 13,400 Sq. Km and there are 12 Towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. **[6]**
- c) Explain in brief the following: **[3 + 3 = 6]**
- i) Traffic Volume Survey.
 - ii) Accident Studies.

OR

- Q2)** a) Write a short note on Origin and Destination Study. **[4]**
- b) What are the various objectives of preliminary survey for highway location? Explain in brief the various steps involved in conventional method of surveying. **[3 + 3 = 6]**
- c) Explain with a neat sketches various road patterns commonly in use. **[3 + 3 = 6]**

P.T.O.

- Q3)** a) Enumerate the steps for practical design of Super elevation. [6]
- b) State the various factors governing the overtaking sight distance. Find the safe overtaking sight distance for a highway having design speed of 100 Km/h. Assume Maximum acceleration of overtaking vehicle = 0.53 m/sec². [2 + 4 = 6]
- c) Derive an expression for finding the Extra Widening required on Horizontal Curve. [6]

OR

- Q4)** a) A vertical summit curve is formed at the intersection of two gradients, +3.0% and -5.0%. Design the length of summit curve to provide a stopping sight distance for a design speed of 80 Km/h. Assume other data. [6]
- b) Write a short note on construction of WBM road. [6]
- c) Define stopping sight distance. Explain in brief the factors on which the stopping sight distance depends. [1 + 5 = 6]

- Q5)** a) State the various desirable properties of aggregates used in road construction. Explain in brief the stepwise procedure of determining Flakiness Index of Aggregate. [2 + 4 = 6]
- b) Calculate the Stress at interior region of a cement concrete pavement using Westerggards stress equation. Use the following data:
Wheel Load = 5100 kg, Modulus of Elasticity of concrete = 3×10^5 kg/cm², Pavement thickness = 18 cm, Poissons ratio = 0.15, Modulus of Subgrade reaction = 6.0 kg/cm³, Radius of contact area = 15 cm. [6]
- c) Explain in brief the following: [2 + 2 = 4]
- i) Dowel bar.
 - ii) WMM.

OR

- Q6)** a) A two lane two way road is at present carrying a traffic of 1000 Commercial Vehicle Per Day (CVD) it is to be strengthened for growing traffic needs. The VDF has been found to be 3.0. The rate of growth of traffic is 10% per annum. The period of construction is 5.0 years. The pavement is to be designed for 15 years after construction. Calculate the cumulative standard axles to be used in design. [6]

- b) Write a short note on Joints in Concrete Pavement. [4]
- c) What is softening point of Bitumen? Explain in detail the laboratory procedure of determining the softening point of Bitumen. [1 + 5 = 6]

SECTION-II

- Q7)** a) Explain in brief the following: [3 + 3 = 6]
- i) Wind Rose Type 1.
- ii) Taxiway.
- b) Explain the characteristics of good airport layout. Draw a neat sketch of typical airport layout of single runway. [4 + 2 = 6]
- c) How Runway orientation should be done? Discuss. [4]

OR

- Q8)** a) Enlist and explain in brief the various aircraft characteristics. [2 + 4 = 6]
- b) Explain the following terms: [3 × 2 = 6]
- i) Hanger.
- ii) Minimum Circling radius.
- iii) Calm period.
- c) Explain in brief the advantages and limitation of air transportation. [2 + 2 = 4]

- Q9)** a) State the various methods commonly used in estimation of flood discharge at a bridge site. How is the Linear Waterway of a bridge is fixed. [2 + 4 = 6]
- b) Calculate the flood discharge from the catchment of 65 Square kilometers when the rainfall during the storm was 15 cm. in two hours. The time of concentration is 20 hours and the runoff coefficient for the catchment is 0.35. [6]
- c) What is scour depth? State factors upon which pattern of scour depend. Why allowance should be made in the observed scour depth. [2 + 2 + 2 = 6]

OR

- Q10)a)** Discuss the various factors which should be considered while selecting a site for a bridge. [6]
- b) Determine the waterway of the bridge across a stream with a flood discharge of $300 \text{ m}^3 / \text{sec.}$, velocity 1.5 m/sec and width of flow at high flood level is 70 m . The allowable velocity under bridge is 1.8 m/sec . Assume permissible safe velocity under the bridge is equal to 90% of allowable velocity under the bridge. [6]
- c) Derive an equation for Economical span of a bridge. State the assumptions clearly. [4 + 2 = 6]

- Q11)a)** Define Pier. State the various types of piers also State the requirements of good pier. [2 + 2 + 2 = 6]
- b) What is Cut water and Ease Water? Why it is necessary? Sketch any two shapes of Cut water and Ease Water. [2 + 2 + 2 = 6]
- c) Write a short note on Erection and Maintenance of Bridges. [6]

OR

- Q12)a)** How will you account for the following in the design of Highway Bridge [2 + 2 + 2 = 6]
- i) Centrifugal Force.
- ii) Earthquake Force.
- iii) Wind Load.
- b) Define Bridge bearing. State the types of bearings. Why Bearings are necessary in bridges. [2 + 2 + 2 = 6]
- c) Explain the following with a neat sketches: [2 + 2 + 2 = 6]
- i) Abutment pier.
- ii) Cantilever bridge.
- iii) Traverser bridge.



Total No. of Questions : 12]

SEAT No. :

P3176

[Total No. of Pages : 2

[4859]-150

B.E. (Production Engineering)
TOTAL QUALITY MANAGEMENT
(Elective-IV(C)) (Semester- II) (2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss principles of TQM. [10]
b) Explain barriers to TQM implementation. [8]

OR

- Q2)** a) Explain various steps for Quality Planning [10]
b) Discuss dimensions of Quality [8]

- Q3)** a) Explain Juran Philosophy of Quality management. [8]
b) Explain Crosby Philosophy of Quality management. [8]

OR

- Q4)** a) Discuss how customer complaints are useful to organisation and also discuss steps to deal with complaints [8]
b) Discuss elements of TQM. [8]

- Q5)** a) Discuss Ishikawa's Seven Quality Tools. [8]
b) Discuss Stages of FMEA. [8]

OR

- Q6)** a) Discuss Quality function Deployment (QFD) [8]
b) Discuss benefits of FMEA. [8]

P.T.O.

SECTION-II

- Q7)** a) Explain various methods used to improve Reliability. [10]
b) Discuss relation of maintenance and reliability. [8]

OR

- Q8)** a) Discuss various Reliability testing methods. [10]
b) Explain concept of maintainability and availability. [8]

- Q9)** a) Discuss control charts for variables. [8]
b) Explain the concept of six sigma. [8]

OR

- Q10)** a) Explain how organization is important for quality. [8]
b) Discuss various steps to be followed while performing audit. [8]

- Q11)** a) Discuss Benefits of IOS 9000 certifications. [8]
b) Explain ISO/TS16949:2002 for Automobile Industry. [8]

OR

- Q12)** Write short notes on the following. [16]
a) ISO14001:2004 standards.
b) Concept of CMMI.



Total No. of Questions : 12]

SEAT No. :

P3626

[Total No. of Pages : 6

[4859]-151

B.E. (Production S/W)

OPERATION RESEARCH & MANAGEMENT

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.
- 2) Answer 3 questions from Section I and 3 questions from Section II.
- 3) Answers to the two sections should be written in separate books.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Figures to the right indicate full marks.
- 6) Your answers will be valued as a whole.
- 7) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

SECTION - I

Q1) a) Explain the terms key decisions, objectives, alternatives and restrictions in the context of linear optimization models. [6]

b) Solve using simplex method [10]

$$\text{Maximize } Z = 2x_1 + 5x_2$$

$$\text{Subject to } x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 \leq 21$$

$$x_1 + x_2 \leq 9$$

$$x_1, x_2 \geq 0$$

OR

Q2) a) A firm manufactures pain relieving pills in two sizes A & B. Size A contains 4 grains of element X, 7 grains of element Y and two grains of element Z. Size B contains 2 grains of element X, 10 grains of element Y and 8 grains of element Z. It is found by the users that it requires at least 12 grains of element X, 74 grains of element Y and 24 grains of element Z to provide immediate relief. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as standard L.P.P. [4]

P.T.O.

b) Solve using, Big M method [12]

Maximize $Z = 3x_1 - x_2$

Subject to the constraint

$$2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

Q3) a) Explain different applications of transportation & assignment models. [6]

b) Consider the problem of five operators to five machines. [10]

The assignment costs are given below :

		Operators				
		I	II	III	IV	V
Machines	A	10	5	13	15	16
	B	3	9	18	3	6
	C	10	7	2	2	2
	D	5	11	9	7	12
	E	7	9	10	4	12

Assign the operators to different machines so that total cost is minimized.

OR

Q4) a) How unbalanced Assignment problem is solved? How maximization Assignment problem is solved? [4]

b) Find the optimum solution to the following transportation problem in which the cells contains the transportation cost in rupees. [12]

	W ₁	W ₂	W ₃	W ₄	W ₅	Available
F ₁	7	6	4	5	9	40
F ₂	8	5	6	7	8	30
F ₃	6	8	9	6	5	20
F ₄	5	7	7	8	6	10
	30	30	15	20	5	100 (Total)

- Q5)** a) What are the assumption & limitations of EOQ formula. [6]
 b) A particular item has a demand 10000 units/year. The cost if one procurement is 110 Rs. and holding cost per unit is Rs.2.50 per year. The replacement is instantaneous and no shortages are allowed.

Determine : [12]

- i) The Economic lot size.
- ii) The number of orders per year.
- iii) The time between orders
- iv) The total cost per year if the cost of one unit is Rs. 1.00

OR

- Q6)** a) What are the various assumptions made while dealing with sequencing problems. [6]
 b) There are seven jobs, each of which has to go through the machine A and B in the order AB. Processing times in hours are given as :

Jobs →	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time T. Also find T & idle time for machine A & B. [12]

SECTION - II

- Q7)** a) A Branch of Maharashtra Bank has only one typist. Since the typist work varies in length (Number of pages to be typed), the typing rate is randomly distributed approximating a Poisson Distribution with mean service rate of 8 letters per hour. The letter arrive at rate of 5 per hour during the entire 8 hour work day, if the typewriter is valued at Rs. 2.5 per hour, Determine : [8]
- i) Equipment utilization.
 - ii) The percent time that an arrival letter has to wait.
 - iii) Average system time.
 - iv) The Average cost due to waiting on the part of typewriter.

- b) Discuss dominance rule in games theory with example. Also explain Maxmin and Minimax principle used in Games theory. [8]

OR

- Q8) a) Reduce the following game by dominance and find the game value. [8]

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

- b) A self service store employees has one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service time, find [8]
- Average number of customers in the system.
 - Average number of customers in the queue or average queue length.
 - Average time a customer spends in the system.
 - Average time a customer waits before being served.

- Q9) a) What is Monte Carlo Method of simulation? What are advantages and limitations of simulation technique? [8]

- b) The probability distribution of the failure time for the certain type of electric bulb is given below : [8]

Week	1	2	3	4	5	6	7	8
Prob. of failure	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.0

The cost of individual replacement is Rs. 4 per bulb. The cost of group replacement is Rs. 1 per bulb. If there are 1000 bulbs in use, find the optimal replacement policy under

- Individual replacement.
- Group replacement.

OR

Q10) a) What do you mean by simulation? Explain advantages, limitations & applications of simulations. [8]

b) A taxi owner estimates from his past records that the costs per year for operating a taxi whose purchase price when new is Rs. 60,000/- are as given below :

Age →	1	2	3	4	5
Operating cost Rs.	10000	12000	15000	18000	20000

After 5 years, the operating cost is Rs. 6000 K, where $K = 6, 7, 8, 9, 10$ (K denoting age in years) if the resale value decreases by 10% of purchase price each year, what is the best replacement policy? Cost of money is zero. [8]

Q11) a) The time estimates (in weeks) for the activities of a PERT network are given below :

Activity	to	tm	tp
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network & show critical path. [3]

ii) Determine the expected project length. [1]

iii) Calculate the standard deviation & variance of the project length. [2]

iv) What is the probability that the project will be completed – [4]

1) At least 4 weeks earlier than expected time?

2) No more than 4 weeks later than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date. [2]

vi) The probability that the project will be completed on schedule if the scheduled completion time is 20 weeks. [2]

b) State different types of floats & discuss any one. [4]

OR

Q12) a) The details of a project are as follows :

Activity	Immediate predecessor	Duration (week)
A	–	4
B	–	3
C	–	2
D	A,B,C	5
E	A,B,C	6
F	D	7
G	D,E	6
H	D,E	9
I	F	4
J	G	6
K	H	8

Find the critical path and the corresponding project completion time.[10]

- b) Differentiate between LPM & PERT. What is critical path in project management? [5]
- c) What is Fulkerson's Rule in project management. [3]



Total No. of Questions : 6]

SEAT No. :

P2005

[Total No. of Pages : 3

[4859] - 152

B.E. (Production S/W) (Semester - I)

Mechatronics & Robotics

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define Mechatronic what is scope & Importance of Mechatronic. State the Application of Mechatronic in automobile Industry. **[8]**
- b) What are the basics elements of open loop control system? Explain with Example. **[10]**

OR

- a) Write a short note on Signal Conditioning. **[6]**
- b) Explain the Data Acquisition System with neat sketch. **[6]**
- c) Explain the following. **[6]**
 - i) Summing Amplifier.
 - ii) Integrating Amplifier.

- Q2)** a) Explain with neat sketch 8085 with labeled pins explain any four pin in detail. **[8]**
- b) What are different addressing modes of 8085? Explain for scientific Calculator. **[8]**

OR

- a) What are different Flag registers used in 8085. **[8]**
- b) Define the following. **[8]**
 - i) TTL
 - i) CMOS
 - iii) Digital Logics
 - iv) Parity method for error detection.

P.T.O.

- Q3)** a) Explain the need of interfacing and explain the series and parallel interfacing in brief. [8]
- b) Explain the following command with example. [8]
- i) MVI
 - ii) ADD
 - iii) DAA

OR

- a) Write a program for subtraction of two 8-bit number and addition. Also draw the flow Chart for it. [8]
- b) Compare interfacing of computer and printer with that of computer and CNC. [8]

SECTION - II

- Q4)** a) Explain the basic structure of PLC. [6]
- b) Explain the importance of ladder diagram. [4]
- c) Draw the ladder diagram for an engine 'ON' and kept running till stopped by pressing a button. [8]

OR

- a) Explain the following w.r.t. to Fluid pressure sensor. [8]
- i) Diaphragms
 - ii) Capsules
 - iii) Bellows
 - iv) Tube pressure Sensors
- b) Draw the schematics diagram of bottle filling plant and draw Ladder Diagram for the same. [10]

- Q5)** a) Classify and explain the D. C. motors. [6]
- b) Explain the process Direction control Valve. [4]
- c) Explain the following mechanism. [6]
- i) Rack and Pinion
 - ii) Reserved Belt drive.

OR

- a) Design the mechanical system which can be used. [6]
- i) Transform a rotation through some angle into a linear displacement.
 - ii) Operated sequence of micro switches in a timed Sequence.
- b) A Car board weighing 5 K.G. is held in a gripper using friction against Two opposing fingers. The coefficient of friction is 0.25 .The weight of the Carton is directed parallel to the finger surface. Calculate required gripper Force for the condition given and if shear force value will be 1.5 what would be value of gripper force. [10]

- Q6)** a) Explain the classification Robot. [4]
- b) Explain following: [6]
- i) Work envelope
 - ii) Accuracy
 - iii) Resolution
- c) What is pay load? How it will affect design of a robot. [6]

OR

- a) Explain grippers used in robot. Which types of actuators used in robot Grippers. [6]
- b) Discuss in detail the essential features of robot in following application.[10]
- i) Loading and Unloading
 - ii) Spray Coating
 - iii) Welding (Spot)



Total No. of Questions : 12]

SEAT No. :

P1775

[4859]-153

[Total No. of Pages :4

B.E. (Production S/w)

ADVANCED PRODUCTION TECHNOLOGY

(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Figure to right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Illustrate the following: **[8]**

- i) Optimum cutting speed for HSM machining.
 - ii) Effects of using HSM based processes in die and mould manufacturing.
- b) Explain cutting speed ranges for seven typical machining operation and materials of different machinability rating. **[10]**

OR

Q2) a) Describe the comparison of three different cooling strategies Flood, MQL and Dry machining. **[9]**

- b) Explain with neat sketch of following regarding HSM technology. **[9]**
- i) Ultra high cutting speed.
 - ii) Chip formation
 - iii) Flank wear of ceramic tool

Q3) Explain with neat sketch. **[16]**

- a) Ultra precision lathe machine.
- b) Ultra precision milling machine.
- c) Nano precision CNC machining centre.
- d) Ultra precision grinding machine.

OR

P.T.O.

- Q4)** a) Differentiate between Non conventional machining and micromachining processes. [8]
- b) Explain in brief hard part machining. [8]

- Q5)** Explain the following with reference to group technology: [16]
- a) Part classification and coding system.
- b) Cell formation technique.

OR

- Q6)** a) Explain any one method of Rapid Prototyping technique with examples. [8]
- b) Explain with neat sketch online in process and online post processes and offline inspection methods. [8]

SECTION - II

- Q7)** a) Describe with sketches Linear and Rotary transfer mechanisms. [10]
- b) Write a note on synchronous and non-synchronous material transfer. [6]

OR

- Q8)** Write short note on: (any three). [16]
- a) Vibratory bowl feeders.
- b) Synchronous material transfer
- c) Automated warehouse
- d) Revolving feeder

- Q9)** a) Draw and explain sequencing circuit with neat sketch and explain industrial application of it. [8]
- b) Explain working of a typical regenerative circuit. [8]

OR

Q10)a) What size of accumulator is necessary to supply 4197 cm^3 of fluid in a hydraulic system of maximum operating pressure of 207 bar which drops to minimum 103.5 bar? Assume nitrogen gas pre-charge of accumulator as 67 bar, obtain both isothermal and adiabatic solutions. **[10]**

b) Explain operating characteristics of the pump. What are the factors influencing these characteristics. **[6]**

Q11)a) A 100kN hydraulic press has a total stroke of 1.2m. The initial approach is of 1m. the speed during the next 0.2m stroke is required to be between 1m/min to 3 m/min. The load during return stroke is 40 KN and the speed is to be limited to 5m/min. Provision is required to obtain uniform speed during working stroke and for holding the ram at the top most position. Draw a circuit which will fulfill these requirements. Select different components you have used in the circuit from the data given. Mention the ratings of the components in case it is not available in the given data. **[18]**

OR

Q12) A machine slide is moved by a cylinder. The motion required is as follows: **[18]**

- a) Initially the cylinder moves against a load of 2.5 KN till it reaches the work piece at a speed of about 1.5 m/min.
- b) The speed drops down to about 0.5 m/min as soon as the load increases to 12.5 KN.
- c) The return motion is against a load of 2.5 KN.

Draw a circuit using two pumps to achieve above. Select different components you have used in the circuit from the given data. Assume ratings of the components if necessary.

DATA

1. Suction Strainer :

Model	Flow Capacity (lpm)
S ₁	38
S ₂	76
S ₃	152

2. Pressure Gauge :

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (lpm)	Max Working Pressure & bar
R ₁	11.4	70
R ₂	19	210
R ₃	30.4	70
R ₄	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (lpm)
F ₁	70	0-4.1
F ₂	105	0-4.9
F ₃	105	0-16.3
F ₄	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

9. Cylinder (Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia. (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	60

10. Oil Reservoirs :

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600



Total No. of Questions : 6]

SEAT No. :

P3917

[Total No. of Pages : 2

[4859] - 154

B.E. (Production S/W)

**(a) : MACHINE TOOL DESIGN (Elective - I)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Section - I and Section - II should be written in Separate Answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*

SECTION - I

Q1) Explain

[16]

- a) Geometric Progression
- b) Ray Diagram
- c) Gear Box Layout
- d) Preferred Numbers for Speed Gear Box Design

OR

Draw only schematic sketches for following :

- a) Stepless Drive
- b) Friction and Ball Variators
- c) PIV Drive
- d) Epicyclic Drive

Q2) Explain different types of analysis of forces on machine tool structure. **[16]**

OR

For Machine Tool Structures explain

- a) Design of Beds
- b) Housings, bases and tables

P.T.O.

Q3) Explain different types of calculations involved in various types of design of slideways. **[18]**

OR

Write short notes on following :

- a) Design of Power screws.
- b) Distribution of load and rigidity analysis.

SECTION - II

Q4) Explain design of spindle and spindle support using deflection and rigidity analysis. **[16]**

OR

Explain analysis and preloading of antifriction bearings.

Q5) Explain various dynamic characteristics of cutting process and stability analysis. **[16]**

OR

Draw only sketches for Dynamics of Machines Tools (Any Two) :

- a) Adaptive Control Systems
- b) Electrical Breaks
- c) Relay and Push Button Control

Q6) Explain various design considerations for SPM. **[18]**

OR

Write a short notes on (any three) :

- a) Micro-Machining.
- b) Retrofitting
- c) Recent Trends in Machine Tools
- d) Design Layout of machine tool using matrices.



Total No. of Questions : 12]

SEAT No. :

P2006

[Total No. of Pages : 3

[4859]-156

B.E. (Production)s/w

INDUSTRIAL ROBOTICS

Computer Integrated Manufacturing and Industrial Robotics.
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from section I and any three Questions from section II.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Answers one question from 1 & 2, 3&4,5 & 6,7 & 8,9 & 10,11&12.*

SECTION - I

- Q1)** a) List Out the different models used in CIM? Draw the neat sketch of IBM Model and compare with various Models? [12]
- b) Explain need of Models in CIM. [4]

OR

- Q2)** a) List out the different methods of Rapid Prototyping. Explain any one Method in detail along with example. [8]
- b) Explain the following in detail.
- i) Concept of solid ground Curing.
 - ii) Application Rapid tooling methods to Die design application

- Q3)** a) Explain the Basic Control system used in Robotics [8]
- b) Derive the equation of Kinematics using Homogeneous Transformation. [8]

OR

P.T.O.

- Q4)** a) Explain the principle of Denavit-Hartenberg's convention for dynamics Analysis of Joints along with suitable example. [12]
b) Explain the Concept of Spatial mechanism. [4]

- Q5)** a) Explain the different types of drives used in Robotics. [6]
b) Using a schematic diagram represent a hydraulic circuit to explain the Drives system of bang-bang robot having waist motion. Shoulder and Arm expansion respectively. [12]

OR

- Q6)** a) Explain different types of Actuators used in typical Robot along with sketch. [10]
b) Write a short note on transmission system in Robotics. [4]
c) Explain the concept of basic motion conversion system. [4]

SECTION - II

- Q7)** a) Classify the various types Mechanical grippers used in Robotics. [8]
b) A 12.55 kg rectangular block is gripped in the middle and lifted vertically At velocity 1 m/s. If it accelerates to this velocity at 32.5 m/s^2 and the coefficient of friction between the gripping pad and block is 0.9 Calculate minimum force that would prevent slippage. [8]

OR

- Q8)** a) Explain concept finite element analysis in grippers designs for pressure Fragile. [8]
b) Write a short note on design consideration for gripper design. [8]

- Q9)** a) What are the different types of Sensors used in Robotics? Classify. [8]
b) Distinguish between tactile sensor and non Tactile Sensors. [4]
c) What do you mean Optical Sensors explain in detail. [4]

OR

Q10)a) What is robot vision? What are the types of vision sensors used to take the Image of an object? [8]

b) Explain Important technique use in robot vision system. [8]

- i) Thresholding
- ii) Region growing
- iii) Edge detection
- iv) Template Matching

Q11)a) Explain along with sketch the application Robot in the following Area.[12]

- i) Spray Painting
- ii) Spot Welding
- iii) In medical field

b) Explain the application of CLIMBING Robot in detail. [6]

OR

Q12)Write a short note on following. [18]

- i) Interfacing of robotics with PC.
- ii) Obstacles avoidance technique in robotics.
- iii) VAL programming used in robotics.



Total No. of Questions : 12]

SEAT No. :

P4422

[Total No. of Pages : 2

[4859]-157

B.E. (Production-Sandwich) (Semester - I)

PLASTIC ENGINEERING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss basic chemistry of plastic material Structure. [8]
b) Explain types of plastics materials [10]

OR

- Q2)** a) Explain importance of additives used in plastics. [8]
b) Discuss common alloys and blends used in plastic. [10]

- Q3)** a) Discuss specifications used in injection molding machine with suitable sketches. [8]
b) State various design considerations in injection mould [8]

OR

- Q4)** a) Explain functions of register ring, sprue bush with sketches. [8]
b) Explain any two cooling methods of Injection moulds. [8]

- Q5)** a) Discuss various problems observed in extrusion. [8]
b) Explain single and twin extruders with suitable sketches [8]

OR

P.T.O.

- Q6)** a) Discuss special features of extrusion dies. [8]
b) Explain blown film extrusion with suitable sketch [8]

SECTION - II

- Q7)** a) Explain step by step procedure to be used in manufacturing bottle of one liter with suitable sketches. [10]
b) Explain rotary injection blow molding with suitable sketches. [8]

OR

- Q8)** a) Explain extrusion blow molding processes with suitable sketches. [8]
b) Explain injection blow with suitable sketches. [10]

- Q9)** a) Discuss process factors in thermoforming. [8]
b) Explain plug assist-forming thermoforming of PP sheets. [8]

OR

- Q10)**a) Explain vacuum forming with suitable sketches. [8]
b) List various problems observed in thermoforming. [8]

- Q11)**a) Explain guidelines for geometry of tool in machining of plastics in various operations. [10]
b) Explain i) Filing ii) Tumbling [6]

OR

- Q12)**a) Explain buffing and sawing in plastic. [10]
b) Explain trimming and routing of thermosetting and thermoplastics. [6]



Total No. of Questions : 12]

SEAT No. :

P2037

[4859] - 158

[Total No. of Pages : 2

**B.E. (Production Sandwich Engineering)
ERGONOMICS AND HUMAN FACTORS IN ENGINEERING
(2008 Pattern) (Semester - I) (Elective - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

UNIT - I

- Q1)** a) Explain the basis for ergonomic problem identification. [8]
b) Explain design of manual materials handling task. [10]

OR

- Q2)** a) Write a note on strength and endurance. [8]
b) How does work load and work efficiency have an impact on ergonomics issues. [10]

UNIT - II

- Q3)** a) Differentiate between work surface height and working height. [8]
b) Describe how is workspace envelope for standing personnel designed with ergonomics perspective. [8]

OR

- Q4)** a) Write a note on mirror image arrangements. [8]
b) Discuss any four principles of arranging components in physical space with a suitable example. [8]

UNIT - III

- Q5)** a) What do you mean by static and dynamic information? How is it managed using visual displays? [8]
b) What are the factors considered in the design of controls? [8]

P.T.O.

OR

- Q6)** a) What is C/R Ratio? How to decide optimum C/R Ratio? [8]
b) Explain any one special control device in detail. [8]

SECTION - II

UNIT - IV

- Q7)** a) Write a note on color system used in human factors engineering. [9]
b) What do you mean by noise exposure limits? Explain with an example. [9]

OR

- Q8)** a) Differentiate between heat stress index and wind chill index. [9]
b) Describe color systems. Also discuss the energy considerations during selection of luminaries. [9]

UNIT - V

- Q9)** a) Discuss the task description and analysis in systems design. [8]
b) What do you mean by interface design? What data is applicable in such situations. [8]

OR

- Q10)** a) Discuss the term errors and accidents. [8]
b) Discuss a case in which you have come across application of human factors engineering? [8]

UNIT - VI

- Q11)** a) What is WFS? What are its types? Explain Detailed WFS in brief. [12]
b) Explain the Reach element used in MTM - 1? What are its classes? [4]

OR

- Q12)** a) Explain MOST and its types in brief. [8]
b) Write a note on Mento Factor System in brief. [8]



Total No. of Questions : 12]

SEAT No. :

P3918

[Total No. of Pages : 2

[4859] - 159

B.E. (Production Engineering) (S/W)

MATERIALS MANAGEMENT AND LOGISTICS

(Elective - II) (2008 Pattern) (Revised)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the concepts Value Analysis and Value Engineering giving example. [9]
b) What is Material Requirement Planning (MRP1)? Explain in detail. [9]
OR
- Q2)** a) What are the objectives of materials management? [9]
b) What are the factors influencing Make or Buy decision. Explain in brief.[9]
- Q3)** a) Explain Import Cycle with flowchart. [8]
b) Explain different objectives of Purchasing. [8]
OR
- Q4)** a) What are the factors to evaluate potential Supplier? [8]
b) What is Vendor development? Explain any one method of vendor rating in brief. [8]
- Q5)** a) What is store identification? Explain Brisch system of codification briefly. [8]
b) Explain waste disposal system in brief. [8]

P.T.O.

OR

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]
b) Explain and differentiate between [8]
i) Centralized and Decentralized stores.
ii) Annual stock taking and Continuous stock taking.

SECTION - II

- Q7)** a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]
b) Explain Logistical performance cycle. [8]

OR

- Q8)** a) What is the importance of warehouse? List the types of warehouses. [8]
b) List and explain in brief economic and service benefits of warehousing. [8]

- Q9)** a) Briefly explain ABC analysis with suitable example. [8]
b) Spartans engineering needs 5400 units/year of bought out component which will be used in its main product. The ordering cost is Rs. 250 per order and carrying cost per unit per year is Rs. 30. Find [8]
i) Economic order quantity
ii) Number of orders per year
iii) Time between successive orders.

OR

- Q10)**a) List and explain different types of costs in inventory. [8]
b) Derive the Economic Order Quantity (EOQ) formula for the Purchase model without shortages. [8]

- Q11)**a) Define following terms related to inventory and show diagrammatically. [9]
i) Safety stock
ii) Reorder level
iii) Lead time
iv) Average inventory level
b) Explain Fixed Period (P) system and Fixed Quantity (Q) system in brief. [9]

OR

- Q12)**a) Derive the formula for EMQ when replenishment is non instantaneous (Gradual). State the assumptions made. [9]
b) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]



Total No. of Questions : 8]

SEAT No. :

P3515

[4859] - 16

[Total No. of Pages : 3

B.E. (Civil)

ADVANCED STRUCTURAL DESIGN

(Elective - III) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Attempt Q. No.1 or Q. No.2, Q. No.3 or Q. No. 4 from section - I and Q. No.5 or Q. No.6, Q. No.7 or Q. No.8 from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of cell phone is prohibited in the examination hall.*
- 7) *Use of electronic pocket calculator, steel table and relevant IS code is allowed.*

SECTION - I

Q1) Design a castellated beam to carry an imposed load of 5.0 kN and dead load of 4.0 kN over a simply supported span of 12 m. The compression flange is laterally restrained along the complete span. Use yield stress, $f_y = 250$ MPa and design section as per limit state method of design. **[25]**

OR

Q2) a) State and explain in brief, the mode of failure of castellated beam. **[8]**

b) Explain in details composite roof deck system using light gauge section. **[7]**

c) Explain design steps of compression and tension members with usual notation using light gauge sections. **[10]**

Q3) Two channel sections without bent lips 200 mm × 50 mm and 2.5 mm thick are connected with webs to act as beam. The effective span of a simply supported beam is 6 m. The beam is laterally supported throughout its length. Determine the maximum uniformly distributed load which can be supported by the beam. Assume $f_y = 232$ N/mm² and $I_x = 780 \times 10^4$ mm⁴ **[25]**

P.T.O.

OR

- Q4)** Analysis the gable frames as shown in Fig. 4 by plastic method and determine the plastic moment m_p . [25]

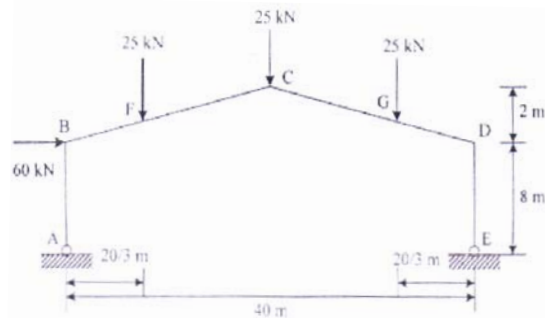


Fig. 4

- Q5)** Design an intermediate panel of a flat slab floor system of size 12m × 20 m for a residential building divided into panels of 4 m × 5 m. [25]

Loading class = 3 kN/m²

Materials : M 30 grade of concrete and Fe 500 grade of steel

Column size = 400 mm × 500 mm

Sketch the reinforcement details in an interior panel of the flat slab.

OR

- Q6)** A reinforced concrete grid floor system of a porch is to be designed to cover an area of 10 m × 10 m, the spacing of the ribs in mutually perpendicular direction being 2.5 m c/c. Live load is 3 kN/m². Adopt M30 grade of concrete & Fe 500 grade of steel. Analyze the grid floor & design suitable reinforcements in the rib & slab. Draw the cross section of the grid showing reinforcement details in the two perpendicular directions. [25]

- Q7)** An elevated water tank of capacity 200 m³ is supported on 8 equally spaced columns along periphery and 1 column at center, along a circle of 8850 mm diameter. Decide suitable dimensions of all components of the container and design the, following components : [25]

- Top slab.
- Top ring girder.
- Cylindrical tank wall.

Use M30 concrete and Fe500 steel. Draw neat sketches, showing details of reinforcement.

OR

Q8) Design a RCC staging for ESR, circular in plan for 300 m^3 with staging height 13 m using M30, Fe500 in earthquake zone V. Safe bearing capacity is 200 KN/m^2 . **[25]**

Assume approximate dimension of container, wall, top, bottom slab thickness, beam sizes & number & pattern of columns. Design must include calculations of vertical loads and horizontal force calculations. Design the bracings, columns & foundations. Draw the reinforcement details. Design of container is not required.



Total No. of Questions : 12]

SEAT No. :

P3919

[Total No. of Pages : 5

[4859] - 160

B.E. (Production S/W)

FINANCIAL MANAGEMENT AND COST CONTROL

(Elective - II (c)) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 & Q11 or Q12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define working capital. Why it is required? Explain various sources of finance. [8]
- b) What is importance of Ratio Analysis? Explain the importance of following ratios. [8]
- i) Quick Ratio
 - ii) Inventory Turnover Ratio
 - iii) Debt - Equity Ratio

OR

- Q2)** a) Distinguish between 'Profit maximization' and 'Wealth maximization' objectives of the firm. [8]
- b) Explain functions of finance management. Explain the difference between finance and accounting relating to the treatment of funds and decision making. [8]

- Q3)** a) There are two mutually exclusive projects under active consideration of a company. Both the projects have a life of 5 years and have initial cash outlays of Rs. 1,00,000 each. The company pays tax at 50% rate and the maximum required rate of the company has been given as 10%. The straight line method of depreciation will be charged on the projects. The projects are expected to generate a net cash inflow before taxes as follows: [10]

P.T.O.

Year	Project X (Rs.)	Project Y (Rs.)
1	40,000	60,000
2	40,000	30,000
3	40,000	20,000
4	40,000	50,000
5	40,000	50,000

With the help of the above given information you are required to calculate:

- i) The Pay-back Period of each project
 - ii) The Net Present Value and Profitability Index for each project
- b) Discuss in brief importance of capital expenditure. [6]

OR

Q4) a) Explain essential features for effective operating of control of capital expenditure. [10]

- b) From the following information you are required to calculate pay-back period: A project requires initial investment of Rs. 40,000 and generate cash inflows of Rs. 16,000, Rs. 14,000, Rs. 8,000 and Rs. 6,000 in the first, second, third, and fourth year respectively. [6]

Q5) a) Write a short note on Sources of working capital. [9]

- b) Jhon C. Ltd. sells goods on a gross profit of 25%. Depreciation is considered as a part of cost of production. The following are the annual figures given to you :Sales (2 months credit) Rs. 18,00,000 Materials consumed (1 months credit) 4,50,000 Wages paid (1 month lag in payment) 3,60,000 Cash manufacturing expenses (1 month lag in payment) 4,80,000 Administrative expenses (1 month lag in payment) 1,20,000 Sales promotion expenses (paid quarterly in advance) 60,000 The company keeps one month's stock each of raw materials and finished goods. It also keeps Rs. 1, 00,000 in cash. You are required to estimate the working capital requirements of the company on cash cost basis, assuming 15% safety margin. [9]

OR

- Q6)** a) Write note on concept of working capital. [9]
b) Hi-tech Ltd. plans to sell 30,000 units next year. The expected cost of goods sold is as follows: [9]

	Rs. (Per Unit)
Raw material	100
Manufacturing expenses	30
Selling, administration and financial expenses	20
Selling price	200

The duration at various stages of the operating cycle is expected to be as follows:

Raw material stage	2 months
Work-in-progress stage	1 month
Finished stage	1/2 month
Debtors stage	1 month

Assuming the monthly sales level of 2,500 units, estimate the gross working capital requirement. Desired cash balance is 5% of the gross working capital requirement, and working -progress in 25% complete with respect to manufacturing expenses.

SECTION - II

- Q7)** a) What is labour turnover? Explain various methods to measure labour turnover. What are the causes and costs associated with labour turnover? [8]
b) From the following information you are required to calculate depreciation rate under WDV Method. [8]

Cost of the Machine	Rs. 10,000
Estimated Useful Life	3 years
Estimated Scrap or Salvage Value	Rs. 1,000

OR

- Q8)** a) What are the requirements of good wage payment system? State to what extent Halsey and Rowan plans fulfils the above requirements. [8]
b) Draw a stores ledger card recording the following transaction that took place in a month under FIFO & LIFO methods : [8]

2015

1 st January	Opening stock	200 pieces @Rs. 2 each
5 th January	Purchase	100 pieces @Rs. 2.20 each
10 th January	Purchase	150 pieces @Rs. 2.40 each
20 th January	Purchase	180 pieces @Rs. 2.50 each
2 nd January	Issues	150 pieces
7 th January	Issues	100 pieces
12 th January	Issues	100 pieces
28 th January	Issues	200 pieces

Q9) a) Define and explain briefly the following types of variances [8]

- i) material price variance
- ii) material usage variance
- iii) material mixture variance
- iv) material yield variance

b) From the following data, calculate labour variances: The budgeted labour force for producing product A is: [8]

20 Semi-Skilled workers @ Re. 0.75 per hour for 50 hours

10 Skilled workers @ Rs. 1.25 per hour for 50 hours

The actual labour force employed for producing A is:

22 Semi-Skilled workers @ Re. 0.80 per hour for 50 hours

8 Skilled workers @ Rs. 1.20 per hour for 50 hours

OR

Q10)a) Define budget control .What are the pre-requisites for the implementation of budget control. [8]

b) From the following information, calculate: [8]

i) Material Cost Variance

ii) Material Price Variance

iii) Material Usage Variance

Quantity of materials purchased 3,000 units

Value of material purchased Rs. 9,000

Standard quantity of material required per ton of finished product = 25 units

Standard rate of materials Rs. 2 per unit

Opening stock of materials Nil

Closing stock of materials 500 units

Finished production during the year 800 tons

Q11)a) Define Marginal Costing. State the applications and limitations of Marginal Costing. [6]

b) From the following particulars, calculate: [12]

i) P / V Ratio Solution:

ii) Profit when sales are Rs. 40,000, and

iii) New break-even point if selling price is reduced by 10%

Fixed cost = Rs. 8,000

Break-even point = Rs. 20,000

Variable cost = Rs. 60 per unit

OR

Q12)a) Define and explain the concept of standard cost and standard costing. [9]

b) The following are the cost information in relation to the manufacture of a product: [9]

Selling price -Rs. 10 per unit

Trade discount -5% of selling price

Material cost -Rs. 3 per unit

Labour -Rs. 2 per unit

Overheads:

Fixed Rs. 10,000

Variable 100% of labour cost

Calculate:

i) BE P.

ii) Profit if sales are 15% above break-even volume.



Total No. of Questions : 12]

SEAT No. :

P1776

[4859]-161

[Total No. of Pages : 3

**B. E. (Production S/W)
d-PRODUCT DEVELOPMENT
(2008 Course) (Elective-II) (Semester-I)**

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer Que.No.1 or Que. No.2, Que. No.3 or Que. No.4, Que. No.5 or Que. No.6 from Section-I and Que.No.7 or Que. No.8, Que. No.9 or Que. No.10, Que. No.11 or Que. No.12. From Section-II.*
- 2) *Answers to the two Sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION-I

- Q1)** a) What do you mean by product design? Explain the role of customer in design of a new product. **[8]**
- b) Explain the following terms for Product Development **[10]**
- i) Product verification
 - ii) Production validation
 - iii) Simplification
 - iv) Specialization

OR

- Q2)** a) What is prototyping? Explain the methods of rapid prototyping in detail **[10]**
- b) Write short notes on:
- i) Concurrent Design
 - ii) Quality Function Deployment **[8]**

P.T.O.

- Q3)** a) Explain the following terms [8]
i) Customer Needs
ii) Customer Satisfaction
iii) Customer Population
iv) Market Segmentation.

- b) What is Technology Forecasting? Explain in detail Technology S-Curve. [8]

OR

- Q4)** a) What is Mission Statement and Technical Questioning? Explain the economic Analysis of Product. [8]

- b) What are the different methods of gathering customer needs information? How will you analyze the information. [8]

- Q5)** a) What is functional modeling? Explain decomposition in detail. [8]

- b) Explain the following terms. [8]

- i) Pugh' s Concept
ii) Selection Charts
iii) Numerical concept scoring
iv) System modeling.

OR

- Q6)** a) Explain the different steps of product development based on product function? [8]

- b) Explain augmentation & aggregation in short? [8]

SECTION-II

- Q7)** a) What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. [8]

- b) What are the applications of product teardown ? Explain force flow diagram in detail. [8]

OR

- Q8)** a) What is product portfolio & architecture explain with suitable example. [8]

- b) What is indented assembly cost analysis & explain function form. [8]

- Q9) a)** Explain the guidelines for design for manufacture & Design for assembly. **[8]**
- b) What is design for piece part production? Explain manufacturing cost analysis. **[8]**

OR

- Q10)a)** Explain the phases of product life cycle with its corresponding technologies. **[8]**
- b) Explain the following terms: **[8]**
- i) Product Testing
 - ii) Field Trials

- Q11)a)** What is product life cycle ? Explain its need & benefits. **[8]**
- b) What is the link between product data & product workflow? Explain PLM in detail. **[10]**

OR

- Q12)a)** Explain in short reliability concept in product development. **[10]**
- b) Write short notes on: **[8]**
- i) Product data & Product work flow.
 - ii) Importance of customer involment.



Total No. of Questions : 12]

SEAT No. :

P1777

[4859]-162

[Total No. of Pages : 2

B. E. (Production S/W)
a: SUPPLYCHAIN MANAGEMENT
(2008 Course)(Semester-II) (ElectiveIII)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two Sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the process of understanding the customer and supply chain uncertainty. [9]
- b) What are competitive & supply chain strategies of an organisation? What is strategic fit? [9]

OR

- Q2)** a) Explain the process of understanding the customer and supply chain uncertainty. [9]
- b) Write short notes on supply chain drivers and obstacles. [9]

- Q3)** a) What are the different methods of forecasting? Discuss them briefly. [8]
- b) Explain the importance of aggregate planning in supply chain. [8]

OR

- Q4)** a) Discuss the importance of planning demand and supply in supply chain. [8]
- b) Discuss the importance of demand forecasting in supply chain. [8]

- Q5)** a) Discuss the role of safety inventory in supply chain. [8]
- b) What is product availability ? Describe any one type of replenishment policy. [8]

OR

- Q6)** a) What actions a manager can take to overcome the obstacles and achieve co-ordination in supply chain? [8]
- b) Explain any one method for managing economics of scale in a supply chain. [8]

P.T.O.

SECTION-II

- Q7)** a) Discuss the importance of information and information technology in supply chain. [9]
- b) List out various factors influencing Network design in supply chain. [9]

OR

- Q8)** a) Discuss the role of transportation in supply chain. Mention the various modes of transportation with their strengths and weaknesses. [9]
- b) Discuss the role of facility decision in supply chain. [9]
- Q9)** a) How the design of distribution network has been affected due to evolution of E-business? [8]
- b) What is bull whip effect? How it relates to lack of co-ordination in Supply Chain. [8]

OR

- Q10)** a) Discuss the actions taken by Manager to overcome the obstacles and to achieve co-ordination in supply chain. [8]
- b) Explain the benefits of coordination and E-business system in supply chain. [8]
- Q11)** a) Explain the various parameters and systems used to evaluate SCM performance. [8]
- b) Discuss about the evaluation of finance in supply chain decision. [8]

OR

- Q12)** a) What is 'Decision Tree'? Summarise basic steps in decision tree analysis. [8]
- b) What are the impact of financial factors on supply chain decisions. [8]



Total No. of Questions : 12]

SEAT No. :

P3517

[4859] - 163

[Total No. of Pages : 2

B.E. (Production Sandwich) (Semester - II)
PLANT ENGINEERING & MAINTENANCE
(Elective - III) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What do you understand from measure of performance and productivity of plant? **[8]**

b) Explain preventive and brake down maintenance? **[8]**

OR

Q2) a) Explain Parato chart. **[8]**

b) Discuss principles of plant management. **[8]**

Q3) a) Discuss plant facility related to human need. **[8]**

b) Explain types of layout? **[8]**

OR

Q4) a) Explain Management Information Technology. **[8]**

b) Discuss PQRS analysis and REL chart? **[8]**

Q5) a) Discuss Simulation for spare part management. **[8]**

b) Explain maintenance of Manufacturing machines. **[10]**

P.T.O.

OR

Q6) Write short notes on following : **[18]**

- a) Role of Maintenance Department.
- b) Predictive base maintenance.
- c) MICLASS software for classification and coding.

SECTION - II

Q7) a) Write schedule of preventive maintenance. **[8]**

b) Discuss mathematical model for life cycle costing. **[8]**

OR

Q8) a) Explain various preventive maintenance with life cycle costing. **[8]**

b) What is reliability? Discuss in detail. **[8]**

Q9) a) Explain pollution control issues in chemical plants. **[8]**

b) Discuss importance of safety. **[8]**

OR

Q10)a) What is energy audit? Explain its importance with example. **[8]**

b) Explain issues related to recycling and wastages. **[8]**

Q11)a) Explain Total Productive Maintenance. **[8]**

b) What are ferrography & hot ferrography? **[10]**

OR

Q12)a) Discuss condition based maintenance. **[10]**

b) Explain RAM analysis. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1778

[4859]-164

[Total No. of Pages : 2

B. E. (Production Sandwich)

c:INDUSTRIALRELATIONS&HUMANRESOURCEMANAGEMENT

(2008 Course)(Semester-II)(ElectiveIII)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Answer 3 questions from section 1 and 3 questions from section 2.*
- 3) *Assume suitable data, if necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) Explain in detail about the impact of globalization and information technology on industrial relations. **[9]**

b) What is trade union? Explain the problems faced by trade union. **[9]**

OR

Q2) a) What is Industrial Relation? Explain scope, objectives of industrial relations. **[9]**

b) Define collective Bargaining. Explain the reasons for its success and failure. **[9]**

Q3) a) Explain role of HR manager & structure of HR department. **[8]**

b) Discuss HR strategies and organizational strategies. **[8]**

OR

Q4) a) Explain Personnel Administration. State its objectives and principles. **[8]**

b) Describe elements of HRD systems. Also discuss their goals, elements. **[8]**

Q5) Write short Notes (any two): **[16]**

a) Objectives of manpower planning.

b) Succession planning.

c) Promotion.

OR

Q6) Write short Notes (any two): **[16]**

a) Recruitment resources.

b) Reward and compensation strategies.

c) Job rotation.

P.T.O.

SECTION-II

- Q7)** a) Discuss various methods of training. [9]
b) Explain tools & aids used for effective training. [9]

OR

- Q8)** a) Discuss need & objectives of employee training. [9]
b) What are major procedures of training? [9]

- Q9)** a) Explain in detail competency Mapping. [8]
b) Explain how performance management system can be aligned with business strategies of an organization. [8]

OR

- Q10)** a) Discuss various methods of performance appraisal. [8]
b) Explain strategic importance of 360 degrees feedback. [8]

Q11) Write short notes on (any TWO): [16]

- a) Industrial democracy.
- b) Golden handshake.
- c) Role of HRD in developing IR.

OR

Q12) Write short notes on (any TWO): [16]

- a) Retrenchment and layoff.
- b) Employee Morale.
- c) Downsizing and project based employment.



Total No. of Questions : 6]

SEAT No. :

P3516

[4859] -165

[Total No. of Pages : 2

B.E. (Production S/W) (Semester - II)
MARKETING MANAGEMENT (Elective - III- (d))
(Self Study) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Section-I and Secetion - II should be written in different answer books.*
- 2) *Questions to write indicate full marks.*
- 3) *Assume suitable data wherever necessary.*

SECTION - I

Q1) Explain marketing philosophy of business with suitable example. **[16]**

OR

Explain : **[16]**

- a) Industrial Marketing Perspective
- b) Understanding and monitoring environment.

Q2) Explain various guidelines, you will recommend to TV Consumer shop owner for understanding consumer's decision process. **[16]**

OR

How will you analyze Consumer Behavior for Big shop owners for creating persectives of organizational buyers in industrial markets. **[16]**

Q3) Explain different market segments for CAR and how it is positioned in market. **[18]**

OR

How will you formulate marketing strategies for a newly developed Two Wheeler Bike. **[18]**

P.T.O.

SECTION - II

Q4) Explain : **[16]**

- a) Marketing Intermediaries
- b) Marketing logistics

OR

Explain various Price Theories. How it is helpful in establishing and managing prices. **[16]**

Q5) Explain : **[16]**

- a) Services Marketing
- b) Managing Sales force and sales territories

OR

Explain Marketing and technological innovations. **[16]**

Q6) Write short notes on : **[18]**

- a) Marketing Research
- b) Structure and Methods

OR

Explain role of quantitative techniques and tools in marketing research. **[18]**



Total No. of Questions : 6]

SEAT No. :

P3627

[Total No. of Pages : 2

[4859] - 166

B.E (Printing)

TECHNOLOGY OF GRAVURE

(2008 Pattern) (Semester - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to two sections should be written separately.*
- 2) *Draw neat diagram wherever necessary.*

SECTION - I

Q1) a) Electronic Engraving is consistent than Etching process. Explain [9]

b) Explain the role of cell structure in ink transfer. [9]

OR

Explain Gravure cylinder making by electronic engraving process. [18]

Q2) Write Notes on [16]

- a) Leveling Effect
- b) Polarization Effect in Electrolyte
- c) Anode to Cathode Distance
- d) Current Density of Electrolyte

OR

Explain the factors affecting plating of gravure cylinder. [16]

Q3) Explain in detail Gravure process. [16]

OR

Explain different types of inks used in gravure process. [16]

P.T.O

SECTION - II

Q4) Viscosity plays an important role in ink transfer. Explain [18]

OR

Explain in detail doctor blade pressurization of gravure press. [18]

Q5) Explain the effect of impression roller hardness on print quality. [16]

OR

Explain the different pressurization methods of an impression system. [16]

Q6) Explain in detail ELS technology for a Gravure press. [16]

OR

Write notes on: [16]

- a) Dot skips
- b) Doctor Blade Streaks
- c) Imbalance of a Roller
- d) Web Transport Rollers



Total No. of Questions : 6]

SEAT No. :

P3628

[Total No. of Pages : 2

[4859] - 167

B.E. (Printing Engineering)
DIGITAL IMAGING & PRINTING
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Specify Digital Image Resolution? Explain digital resolutions as per print processes. **[18]**

OR

Explain Binary coding of Bitmaps.

Q2) Evaluate File formats for Large format printing. **[16]**

OR

Explain Image compression in detail.

Q3) Explain sensing devices design in detail. **[16]**

OR

Explain structure of CMOS sensors in detail.

Q4) Explain Rip systems for Laser printing systems. **[18]**

OR

Describe Thermal Printing and applications.

Q5) Explain Applications of Variable data Printing. **[16]**

OR

Explain POD system and applications in detail.

P.T.O

Q6) Describe and discuss Future trends in digital printing.

[16]

OR

Explain Role of digital imaging and printing for E publishing.



Total No. of Questions : 6]

SEAT No. :

P3177

[Total No. of Pages :2

[4859]-168

B.E. (Printing)

STUDY OF ADVERTISING AND MULTIMEDIA

(2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right side indicate full marks.*

SECTION-I

- Q1)** a) Draw a general communication model and explain its application in terms of marketing communication. [9]
- b) Write short notes on: [9]
- i) Message Content
 - ii) Message Source

OR

- a) Which are the four major tools of communication other than advertising? Compare and contrast between advertising and any other two tools of communication. [9]
- b) Write short notes on: [9]
- i) Four P's of marketing
 - ii) Any 2 type of appeals
- Q2)** a) Explain the "AIDA Model" used for effectiveness of advertising. [8]
- b) Explain product life cycle revival of PLC with neat diagram. [8]

OR

- Write short notes on: [16]
- i) Financial Advertising
 - ii) Public relations advertising
 - iii) Institutional Advertising

P.T.O.

Q3) What is market segmentation? What are the different methods of segmentation?
Explain the most effective method in details. **[16]**

OR

What is market research? Explain in details salient features of market research.
Explain in details steps of the market research process. **[16]**

SECTION-II

Q4) Which are the different effective media used in advertising? Explain with the help of suitable case the effective application of print medium and electronic medium. **[16]**

OR

What is outdoor medium for advertising? What are the merits and de-merits of outdoor as a media? Explain with suitable case. **[16]**

Q5) Advertising should be done in terms of Campaign.-Justify. How long should be a campaign? Explain the steps in campaign planning. **[18]**

OR

What is the significance of copy in advertisement? Explain in details the job of copywriter **[18]**

Q6) What are the standard elements of print advertising? Explain in details significance and contribution of each element to make print ad. Effective. **[16]**

OR

Explain with a suitable case any reminder campaign. Mention the objective of the campaign, length and other details as well. **[16]**



Total No. of Questions : 6]

SEAT No. :

P1992

[Total No. of Pages : 2

[4859]-169

B.E. (Printing) (Semester - I)

QUALITY CONTROL TECHNIQUES IN PRINTING
(2008 Pattern) (Elective - I(a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) List out Quality Characteristic in detail.
b) Explain in short the concept of quality control considering any one printing process.

[16]

OR

- a) Explain Quality cost with suitable example of each type.
- b) Define the term quality & write down the need of Quality Inspection.

[16]

- Q2)** Eight consecutive lots of printed sheets received from a vendor were inspected by sampling process. The sample size was varied. The number of defectives in each sample recorded as under.

Sample No.	1	2	3	4	5	6	7	8
Sample Size	110	135	80	150	130	170	90	90
No. of Defectives	4	5	6	3	8	4	0	8

Construct a control chart for Fraction defective & describe whether the printed sheets are in control or not.

[18]

OR

P.T.O.

For a sampling plan determine probability of acceptance of following percentage defectives, also draw a OC Curve [18]

$N = 1200, n = 65, c = 1$

Sr.No	1	2	3	4	5	6
Percentage Defective	0.35%	0.7%	2%	2.5%	4.75%	6.8%

Q3) a) Explain in detail Job Production & Mass Production. [8]

b) Describe Lean manufacturing system in detail. [8]

OR

a) Explain in detail world class Manufacturing. [8]

b) Explain computer Integrated Manufacturing system. [8]

SECTION - II

Q4) a) Explain any two optical & physical properties of paper. [9]

b) Explain the need of checking viscosity of ink & factors on which viscosity is depending. [9]

OR

a) Explain following properties related to Ink : [9]

i) Flow

ii) Color

iii) Opacity

iv) Adhesion

b) Explain Inventory management in Printing Industry. [9]

Q5) a) Explain need of monitor profile with respect to obtained quality printing. [8]

b) Explain Raster Image processing in detail. [8]

OR

a) Explain Offset Lithography process control with help of profile creation. [8]

b) Explain any four file formats. [8]

Q6) Explain the process of press standardization & characterization for Gravure printing. [16]

OR

Describe factors to be considered for press finger printing of Flexography Printing. [16]



Total No. of Questions : 12]

SEAT No. :

P1686

[4859]-17

[Total No. of Pages : 3

B.E. (Civil)

ADVANCED FOUNDATION ENGINEERING

(2008 Pattern) (Elective-III) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator & IS codes & IRC codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) Explain the following: **[18]**

- a) IS code provisions for subsoil explorations.
- b) Significant depth.
- c) IRC provisions for explorations of roads.

OR

Q2) a) Discuss in brief different case studies for failures of foundation. **[9]**

b) Explain any two 'Geophysical Methods'. **[9]**

Q3) a) Compare the following raft foundation design, **[10]**

- i) Conventional Method.
- ii) Soil line method.

b) How will you calculate safe load & settlement from field test data, for a square footing? Explain by sample calculations. **[6]**

OR

P.T.O.

- Q4)** a) Explain 'Hansen's Method'. [8]
b) Explain the use of 'Geo-slope'. [8]

- Q5)** a) How the Q_a is determined in a cyclic pile load test? [8]
b) Discuss various types of piles based upon the functions & materials used. [8]

OR

- Q6)** a) What is 'LLP'? How E_s , T & η_z is determined, for a LLP? [8]
b) Explain the steps for 'Reese & Matlock' method. [8]

SECTION-II

- Q7)** a) Design a sand drains system, showing sample calculations, for the following cases, [10]
i) $k_x = k_y$.
ii) $k_x = 5 k_y$.
b) Explain the steps for 'Stone column design'. [8]

OR

- Q8)** a) How will you determine LCC of under reamed pile for, [10]
i) Clayey soil.
ii) Sandy soil.
b) Explain the procedure for construction of 'stone column'. [8]

- Q9)** a) Explain the design provisions for, [8]
i) Well curb.
ii) Cutting edge.
iii) Steining thickness.
iv) Bottom plug.

- b) Explain 'Lacey's' design for, [8]
i) Grip length.
ii) NSD.

OR

- Q10**a) Discuss the provision made as per IRC for well foundation design. [8]
b) Explain 'Banerjee & Gangopadhyay Analysis'. [8]

- Q11**a) Discuss different types of 'cofferdams'. [8]
b) Explain the steps for 'Anchored sheet pile design'. [8]

OR

- Q12**a) Explain the steps for circular, cellular, cofferdam design. [8]
b) Compute the 'D' & 'P' in anchor rod, for a sheet pile cofferdam of 6.5m high, retaining soil as a backfill & below D.L. is same with following data,

$\phi = \phi' = 30^\circ$, $\gamma_{\text{sat}} = 23 \text{ kN/m}^3$, $\gamma = 19 \text{ kN/m}^3$, Anchor rod is 1.5m below the top, GWT = 3m above D.L. Use 'Free Earth Support' method. [8]



Total No. of Questions : 6]

SEAT No. :

P3629

[Total No. of Pages : 2

[4859] - 170

B.E. (Printing Engineering)
COMMERCIAL GRAPHIC DESIGN
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Explain new trends in graphic design with examples. **[18]**

OR

Explain graphic design page layout. **[18]**

Q2) Explain in detail structure & working of a scanner. **[16]**

OR

Describe importance of ISO in color photography. **[16]**

Q3) Explain ISO standards in Magazine layouts. **[16]**

OR

State layout consideration in a Carton. **[16]**

Q4) State design rules for a paper folding carton. **[18]**

OR

Explain brand protection systems for food packages. **[18]**

P.T.O.

Q5) Describe web page considerations in detail. [16]

OR

Explain multimedia applications in web page designs. [16]

Q6) State and explain costing consideration in Billboard design. [16]

OR

Explain parameters in costing of paper carton packaging. [16]



Total No. of Questions : 6]

SEAT No. :

P3630

[Total No. of Pages : 2

[4859] - 172

B.E. (Printing Engineering)
SECURITY PRINTING
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve any 3 questions from each section.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

Q1) What is a security document? Explain with elements. **[18]**

OR

Describe physical security documentation in detail.

Q2) Explain Security Printing procedures. **[16]**

OR

Explain flexo process application for bank note printing.

Q3) Explain types of smart in security printing. **[16]**

OR

Explain UV printing in security applications.

SECTION - II

Q4) Explain cheque system and its security features. **[18]**

OR

Describe :

- a) Hologram making
- b) Complex fills system.

P.T.O.

Q5) Explain Infrared data printing. **[16]**

OR

Explain properties of security ink.

Q6) State and explain data encryption systems for security. **[16]**

OR

Explain advancements in security printing features.



Total No. of Questions : 6]

SEAT No. :

P3511

[4859]-174

[Total No. of Pages : 1

B.E. (Printing Engineering)
PACKAGE DESIGN AND TECHNOLOGY
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Explain types of Adhesives used in packaging. Also state types of boards and properties in detail. **[18]**

OR

Define parameters of substrates used for packaging. **[18]**

Q2) State problems of duplex board printing with probable solutions. **[16]**

OR

Explain in detail printing processes for packaging **[16]**

Q3) What is corrugation? Explain types **[16]**

OR

Explain process of punching type carton making. **[16]**

Q4) Explain die line and die making process. **[16]**

OR

Explain laser die making in detail. **[16]**

Q5) Calculate cost of A5 Ply corrugated carton : 22"×14"×18" **[16]**

Find : i) Deckle

ii) Weight of Box Paper Cost : 30 Rs Kg. Paper : 150 GSM
(Assume suitable Data if Needed)

OR

State elements of costing for a corrugated carton. **[16]**

Q6) Explain edge crushing test in detail. **[18]**

OR

Explain any 6 test for packaging in detail. **[18]**



Total No. of Questions : 6]

SEAT No. :

P1779

[4859]-175

[Total No. of Pages :3

B.E. (Printing)

PRINT PRODUCTION PLANNING & CONTROL

(2008 Course) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) Explain the classification of production systems in detail with suitable examples. **[16]**

OR

Explain the functions of production control in detail with suitable examples.

Q2) Consider a project consisting of 12 activities with following precedence relationship and durations. **[16]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Immediate predecessor	-	-	A	A	A	D	C	D	E,F	B,I	G,H	J,K
Duration (weeks)	4	8	2	4	9	1	7	3	2	2	5	4

- i) Draw network diagram & find the critical path
- ii) List the total float, free float and independent float for all activities.

OR

P.T.O.

The activities along with their dependency relationships are given below. Draw the arrow diagram.

Activity	Immediate predecessor
A	----
B	----
C	----
E	A
F	A,B
G	B,C
H	C
I	E,F
J	G,H
K	H

Q3) There are seven jobs, each of which has to go through the machines A&B in the order AB. Processing time in hours are given as,

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B **[18]**

OR

There are six jobs, each of which is to be processed through three machines A,B and C in the order ABC. Processing times in hours are

Job	1	2	3	4	5	6
Machine A	3	12	5	2	9	11
Machine B	8	6	4	6	3	1
Machine C	13	14	9	12	8	13

Determine the optimum sequence for these jobs and the minimum elapsed time. Also find the idle time for the three machines and waiting time for the jobs.

SECTION-II

Q4) Explain the Hungarian method of assignment model in detail with example.[16]

OR

Differentiate between Assignment Model and Transportation Model with reference to Definition, Assumptions and applications etc.

Q5) How Transportation model of operations research area helps the management. Explain with the help of example. [16]

OR

Explain in brief NWCM, LCM and VAM methods of solving Transportation problem with suitable example.

Q6) Explain the applications of Linear Programming Model of OR with few examples. [18]

OR

Explain in detail the procedure of formulating the Linear Programming Model with suitable examples.



Total No. of Questions : 6]

SEAT No. :

P3178

[Total No. of Pages : 2

[4859]-177

B.E. (Printing)

Printing Machine Maintenance

(Elective-III(b)) (Semester- II) (2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate answer books.
- 2) All questions compulsory.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of Calculator is allowed.
- 6) Assume Suitable data if necessary.

SECTION-I

- Q1)** a) Draw the design of the dampening system showing the gears. [8]
b) State the rollers that are gear driven. Which gears are used and why?[8]

OR

- a) Inking rollers are driven by spur gears. Why? Explain gear meshing.[8]
- b) How is the drive transmitted from motor to printing cylinders? Explain V belts. [8]

- Q2)** Explain the following [18]

- a) Cleaning walkways and platforms near machines
- b) Cleaning of inking unit

OR

- a) Explain maintenance checklist for bearings and bush. How is roller setting carried out in inking system. [9]
- b) How to decide the concentration of fountain solution (chemistry) that will give a certain pH and conductivity suitable for a given press. [9]

- Q3)** Prepare a preventive maintenance schedule for a CTP processor and exposing device [16]

OR

- What is proactive maintenance. How is it done for flexo machine. [16]

P.T.O.

SECTION-II

- Q4)** a) Preventive maintenance is periodic. State the 3 different ways a preventive maintenance is scheduled. [10]
- b) The probability that printability testing equipment used in an ink lab will need a number of recalibrations per year is given in the following tabel. A service firm is willing to provide any number of necessary calibrations for a fixed fee of Rs. 2000 per month. Without this plan, recalibration costs. Rs.1500 per occurrence. Which approach would be most economical, recalibration as needed or the fixed fee service contract?

Number of recalibration	0	1	2	3	4
Probability of occurrence	15	25	30	20	10

[8]

OR

- a) What is the goal of a maintenance programme? State functions of 5S. [9]
- b) Compare predictive and preventive maintenance. [9]

- Q5)** What is lubrication. State any 2 method of lubrication for a press. Compare antifriction bearings and journal bearings. [16]

OR

Draw a figure of roller bearing. Explain the terms misalignment in bearings, contamination in bearings and improper lubrication in bearings. [16]

- Q6)** Explain working of a stitching machine. State maintenance schedule for the same. [16]

OR

Explain working of a die cutting machine. State maintenance schedule for the same. [16]



Total No. of Questions : 6]

SEAT No. :

P3523

[Total No. of Pages : 2

[4859]-179
B.E. (Printing)
FLEXIBLE PACKAGING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to two sections should be written separately.*
- 2) *Draw neat diagram wherever necessary.*

SECTION - I

Q1) Write properties and applications of the following : **[18]**

- a) LDPE
- b) PET
- c) PVC

OR

Explain the role of polyolefins in Packaging.

Q2) Explain in detail Gravure Machine for flexible packaging applications. **[16]**

OR

Explain in detail Flexo Machine for flexible packaging applications.

Q3) Explain along with diagram Dry lamination techniques. **[16]**

OR

Explain along with diagram Blown Film Extrusion process.

SECTION - II

Q4) Explain in detail various types of pouches. **[16]**

OR

Explain in detail Lami-tubes.

P.T.O.

Q5) Explain the types of caps for various applications. **[16]**

OR

Describe stretch packaging technique for a given product.

Q6) Mention the packaging technology for the following products : **[18]**

- a) Coffee Powder.
- b) Juices.
- c) Cheese.

OR

Mention deterioration factors for the following :

- a) Butter
- b) Wine
- c) Beer



Total No. of Questions : 6]

SEAT No. :

P1687

[4859]-18

[Total No. of Pages : 3

B.E. (Civil)

**ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS
(2008 Course) (Semester-II) (Elective-III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*

SECTION-I

Q1) a) Engineering significance of Precambrian Metamorphic Rocks in Maharashtra State. [8]

b) Field Characters of dykes in Maharashtra. [4]

c) Explain in brief varieties of tachlytic basalt and their field characters. [6]

OR

a) Engineering significance of Precambrian Secondary Rocks in Maharashtra State. [8]

b) Explain varieties of volcanic breccias. [4]

c) Write in detail on Region 2. [6]

Q2) a) Dams on Limestone and Quartzites. [8]

b) Discuss with suitable examples, suitability of compact basalts and amygdaloidal basalts from dam foundation point of view. [8]

OR

a) Treatment to given to a dyke crossing dam alignment. Explain with suitable case histories. [8]

b) Discuss in detail geological conditions resulting to tail channel erosion Maharashtra state. Only mention case histories of dams. [8]

P.T.O.

Q3) Write notes on:

- a) Scarcity of Sand in Deccan traps area. [4]
- b) Influence of Climate on Soil formation. [4]
- c) Groundwater Reservoirs. [4]
- d) In Situ Weathering. [4]

OR

- a) Water bearing characters of Dykes. [4]
- b) Residual Soils of Maharashtra State. [4]
- c) Chances of getting ground water along flow contacts. [4]
- d) Watershed development. [4]

SECTION-II

- Q4)**
- a) Permeability of rock mass. [5]
 - b) Compressive strengths of rock mass. [6]
 - c) Elasticity of rock mass. [3]
 - d) Stand up time of a rock mass during tunneling. [4]

OR

- a) Only mention various rock mass classification systems. Discuss in detail Rock Mass Rating (RMR) classification. [12]
- b) Explain in brief Electrical Resistivity method with neat sketch. [6]

- Q5)**
- a) Tunneling through Compact Basalts. [8]
 - b) Safe Bearing Capacity of bridge. [4]
 - c) Tunnel through fractures. [4]

OR

- a) Preliminary surveys that are carried out while locating a bridge. [8]
- b) Difficulties to be faced while tunneling in folded and faulted strata. [8]

- Q6)** a) Treatment to be given to fault zone crossing dam alignment. Give examples. [8]
- b) Foundation of Monumental buildings. [4]
- c) Filled Grounds. [4]

OR

- a) Role of Geology in Urban Planning. [4]
- b) R.I.S. and Dams. [4]
- c) Suitability of Compact basalt as a construction material. [8]



Total No. of Questions : 6]

SEAT No. :

P3522

[Total No. of Pages : 2

[4859]-180

B.E. (Printing Engineering)

ENTREPRENEURSHIP IN PRINTING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams should be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of electronic pocket calculator is allowed.*

Q1) What is Entrepreneurship? Explain important factors deciding success and failure of a entrepreneurship. **[18]**

OR

Describe business idea and creativity in detail. **[18]**

Q2) Explain Innovation theory by Schumpeter. **[16]**

OR

Write about Social change by Everett Hagen. **[16]**

Q3) What is Production management with detailed functions. **[16]**

OR

How can a project be feasible economically? Also explain method of report preparation. **[16]**

Q4) How is Customer relationship management executed? **[18]**

OR

Explain Product life cycle concept in detail. **[18]**

P.T.O.

Q5) Explain Government Policies about Entrepreneurship. [16]

OR

Write notes on : [16]

a) Sale of goods Act.

b) Contract Act.

Q6) Write notes on : [16]

a) Negotiable Instrument Act.

b) Balance Sheet Reading.

OR

Explain Basic of accounting, profit & loss, Balance Sheet preparation. [16]



Total No. of Questions : 12]

SEAT No. :

P1780

[4859]-181

[Total No. of Pages :3

B.E. (Information Technology)
INFORMATION ASSURANCE & SECURITY
(2008 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer of question 1 or 2,3 or 4, and 5 or 6 from section-I and question 7 or 8, 9 or 10 and 11 or 12 from section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Enlist security goals and mechanism in detail. **[10]**
- b) Differentiate between following: **[8]**
- i) Active and passive attacks
 - ii) Authentication and Authorization

OR

- Q2)** a) Write the Extended Euclidean algorithm to compute the inverse. (Illustrate with proper variables and comments). **[10]**
- b) Illustrate the use of polynomials for secret sharing. **[8]**

- Q3)** a) Draw block diagram of AES and state the general steps in process. **[8]**
- b) Calculate cipher text using RSA algorithm. Given data as follows: Prime numbers P,Q as 7,17 respectively and plain text is to be send is 10. **[8]**

OR

P.T.O.

Q4) a) Describe different modes of operation (ECB, CBC, CFB, OFB,CTR mode) with the help of block diagram. [10]

b) Explain working of MD5 in detail. [6]

Q5) a) Explain role of key distribution center in symmetric system. [8]

b) Illustrate Diffie-Hellman key exchange algorithm with diagram. [8]

OR

Q6) a) Explain public key infrastructure X.509 with the help of architectural block diagram. [8]

b) Draw sequence diagram of Needham Schroeder protocol and explain. [8]

SECTION - II

Q7) a) What is IPSEC? How does AH and ESP differ while working under Tunnel mode and Transport mode. [10]

b) State and explain various categories of intrusion detection system. [8]

OR

Q8) a) What are different requirements of Kerberos? Explain the architecture of Kerberos. What do you mean by Kerberos Realms? [10]

b) Explain SSL architecture in detail. [8]

Q9) a) Write a short note on smart card and chip card transaction. [8]

b) Explain domains of ISO 27001 security standard and state its purpose. [8]

OR

Q10) a) Explain and draw model for ISMS (Information Security Management System) of PDCA Cycle (Plan, Do, Check, Act phase). [8]

b) Illustrate idea of Electronic Cash. [8]

Q11) Write a short note on following (any four)

[16]

- a) Electronic evidence
- b) Internet fraud
- c) Identity theft
- d) Computer Forensic
- e) Cyber tourism

OR

Q12)a) Illustrate Industrial Espionage in IT industry.

[8]

b) Write short note on Indian IT laws 2000, 2008 amendments.

[8]



Total No. of Questions : 12]

SEAT No. :

P1781

[4859]-182

[Total No. of Pages : 3

B.E. (Information Technology)
OBJECT ORIENTED MODELING AND DESIGN
(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is CORBA? What are the basic elements of CORBA? Explain. **[6]**
- b) What is OCL? Give the example of PRE-condition, Post-condition in OCL. **[8]**
- c) Discuss by giving appropriate example when will you model an entity such as 'bank account' as: **[4]**
- i) Attribute.
 - ii) Class.

OR

- Q2)** a) What are the salient features of RUP and? How is it different from waterfall model? **[6]**
- b) Explain 4+1 view architecture with corresponding UML diagram. **[8]**
- c) Model the association that an 'Employee' can work on at most one 'Project' at a time but a Manager can work more than one project at the same time. **[4]**

P.T.O.

- Q3)** a) Explain in detail Class Responsibility Collaborator model. [8]
b) Write a note on relationships in UML. [8]

OR

- Q4)** a) Write a short note on UML versions. [8]
b) Explain common mechanisms in UML. [8]

- Q5)** a) What is use case diagram? Identify the various use case and draw the use case diagram for “Online Shopping System”. [8]
b) Draw a class diagram for an “online CD/DVD library system”. Make suitable additional assumptions about scope and working of the system. [8]

OR

- Q6)** a) Write a note on Communication Diagram. [4]
b) Draw a package diagram for “Online Shopping System” showing packages, and package relationships. [4]
c) Draw a class diagram for “Online Examination System” using advanced notations. Assume suitable data. [8]

SECTION-II

- Q7)** a) What is an interaction? Draw the sequence diagram for the ‘Issue book’ operation of a Library Management System. [8]
b) Explain the timing diagram with its importance in an embedded application. [6]
c) Differentiate between sequence and communication diagram. [4]

OR

- Q8)** a) Draw the state diagram with composite states for ATM card reading and authentication system. [8]
b) Draw the communication diagram for ‘Scheduling a seminar’ activity. [6]
c) What is the purpose and need of interaction overview diagram? [4]

- Q9) a)** Explain the following concepts for Activity diagram: [8]
- i) Pin.
 - ii) Expansion Region.
- b) What are the elements of composite structure diagram? Explain. [8]

OR

- Q10)a)** What do you mean by two tier and three tier architecture? Draw the deployment diagram for a two tier web application. [8]
- b) Explain the following in brief in the context of component diagram. [8]
- i) Provided and required interfaces.
 - ii) Ports and connectors.

- Q11)a)** Draw the component diagram for Course Management system. [8]
- b) Give the different types of systems which can be modeled using deployment diagram? Draw the deployment diagram for an email system. [8]

OR

- Q12)a)** Write short note on following: Pattern and framework. [8]
- b) What is signal? How signals are modeled in UML? Explain with suitable example. [8]



Total No. of Questions : 12]

SEAT No. :

P1782

[4859]-183

[Total No. of Pages : 4

B.E. (Information Technology)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2008 Course) (Semester-I) (414442)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer question number 1 or 2, 3 or 4, 5 or 6 from section-I.*
- 2) *Answer question number 7 or 8, 9 or 10, 11 or 12 from section-II.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Define the following terms: **[8]**

- i) Failures.
- ii) Test bed.
- iii) Errors.
- iv) Software Quality.

b) What are different levels of testing? Which software components are most suitable for unit testing and why? **[8]**

OR

Q2) a) Explain unit test planning in detail. **[8]**

b) Explain difference between following: **[8]**

- i) Integration testing and incremental integration testing.
- ii) Load and stress testing.

Q3) a) Explain in detail different functions/responsibilities to be handled in a testing life cycle or process. **[8]**

b) Draw and explain software defect life cycle. **[8]**

OR

P.T.O.

- Q4)** a) Explain Test case design strategies. Assume you purchased new music system with two speakers. How would you test it? Develop black box test cases for the android mobile phone with pass/fail criteria. [8]
- b) Why mutation testing called fault is based test approach? Explain with an example. [8]
- Q5)** a) Explain GQM technique in detail. Draw a GQM tree for identifying software measures. [8]
- b) Explain the importance of the metric-percentage delinquent fixes in context with software maintenance. Calculate percentage delinquent fixes-if number of fixes delivered in a specific time are 40 and the number of fixes the exceeded the response time criteria by severity level are 80. [10]

OR

- Q6)** Spell Check Specs: The checker accepts as input a document file and an optional personal dictionary file. The checker lists all words not contained in either of these files. The user can query the number of words processed and the number of spelling errors found at any stage during processing. [18]

Item	Weighting Factor		
	Simple	Average	Complex
External Inputs	3	4	6
External Outputs	4	5	7
External Inquiries	3	4	6
External Files	7	10	15
Logical Internal Files	5	7	10

There are 14 technical complexity factors out of that two factors has rating as 5 and six factors has rating as 3 and remaining six has rating as 0 on a scale of 0 to 5. Where 0 means irrelevant, 3 means average and 5 means that it is essential to the system being built.

Based on the above perform the following:

- a) Draw pictorial representation of the system for FP analysis.
- b) Identify internal logical files, external I/P, O/P, Inquiries and Files.

- c) Calculate Function Count (FC).
- d) Calculate Technical Complexity Factor (TCF).
- e) Calculate Function Point (FP).
- f) Explain the importance of FP in software testing.

SECTION-II

- Q7)** a) What are the goals of SQA activity? How does SQA ensure the quality of the product? [8]
- b) List Ishikawa's Seven Basic Quality Tools. Explain their importance in Quality Management. Explain Pareto Chart and Cause and Effect diagram with example. [10]

OR

- Q8)** a) Explain the following software reliability quality attributes: [10]
- i) Usability.
 - ii) Maintainability.
 - iii) Portability.
 - iv) Integrity.
 - v) Interoperability.
- b) Explain the following terms w.r.t. software quality: [8]
- i) Quality.
 - ii) Cost of Quality.
 - iii) Quality Assurance.
 - iv) Quality control.

- Q9)** a) What are the requirements of ISO 9000 and ISO 9001. [8]
- b) ISO 9000 / 9001 ensures production of good quality software. Justify. [8]

OR

Q10)a) Draw and explain the PDCA cycle in detail with reference to ISO 9000:9001. [8]

b) How does the performance improve with Six Sigma? Explain the methodology DMAIC with reference to Six Sigma. [8]

Q11)a) Explain the goals and activities performed in the following KPA's: [8]

i) Organization Process Definition.

ii) Training Program.

b) How is defect prevention and process change management brought into practice? [8]

OR

Q12)a) Draw and describe the various levels of CMM. Explain the KPA's for the 4th level. [8]

b) Write notes on: [8]

i) Requirements Management.

ii) Software Project Planning.

●●●●●

Total No. of Questions : 12]

SEAT No. :

P1783

[4859]-184

[Total No. of Pages : 3

B.E. (Information Technology)
a-ADVANCED DATABASE MANAGEMENT
(2008 Course) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Figures to the right indicates full marks.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Answers to the two sections should be written in separate books.*

SECTION-I

Q1) a) What do you mean by cursors? Explain any one type of cursor in detail with suitable example. **[8]**

b) Explain different database objects in detail. **[8]**

OR

Q2) a) Write a PL/SQL code block for inverting number 1678 to 8761. **[6]**

b) Explain the concept of Embedded SQL. **[8]**

c) What do you mean by Savepoint. **[2]**

Q3) a) Explain with neat and clean diagram transactional workflows. **[8]**

b) What do you mean by Main Memory databases. **[8]**

OR

Q4) a) Explain in detail transaction workflow monitors with suitable diagram. **[8]**

b) Explain the following: **[8]**

i) Reference types in SQL.

ii) Long duration transactions.

P.T.O.

- Q5)** a) Explain in detail different concurrency control protocol. [10]
b) Write difference between OO Vs OR features. [6]
c) Explain with example concept of table inheritance. [2]

OR

- Q6)** a) Write short note on persistent programming languages. [8]
b) What do you mean by DTD? Describe a DTD with suitable example for an XML. [10]

SECTION-II

- Q7)** a) Write in detail about Dimensionality Modeling. [8]
b) Short note on multidimensional Data and how this data can be represented? [8]

OR

- Q8)** a) Explain Apriori algorithm with suitable example. [12]
b) Explain in detail about concept of data mart. [4]

- Q9)** a) Explain K-means algorithm with suitable example. [12]
b) Explain in detail about integrity threats and defense mechanism in DBMS. [6]

OR

- Q10)** a) What do you mean by concept of data mining? Explain the process of Knowledge discovery with suitable architectural diagram. [12]
b) Write note on OLAP Benchmark. [6]

Q11)a) With neat and clean diagram explain architecture of data warehouse along with Different Data flows. **[12]**

b) Write note on predictive modeling. **[4]**

OR

Q12)Write short note on following: **[16]**

a) PL/SQL security.

b) Statistical database audit.

c) DW tools and techniques.

d) Data warehouse design using Oracle.



Total No. of Questions : 12]

SEAT No. :

P1784

[4859]-185

[Total No. of Pages : 3

B.E. (Information Technology)
b-ARTIFICIAL INTELLIGENCE
(2008 Course) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Assume suitable data wherever necessary.*
- 2) *Separate answer books must be used for the sections.*
- 3) *Draw proper diagrams wherever necessary.*

SECTION-I

Q1) a) Define Swarm Intelligence? Where can we apply it? Elaborate with example. **[8]**

b) Describe the Turing test. If the turing test is passed, does this show that computers exhibit intelligence? **[8]**

OR

Q2) a) Define Artificial Intelligence? Give any five applications of AI. **[8]**

b) What is an Intelligent Agent? Give a typical structure of an Intelligent Agent. **[8]**

Q3) a) Apply A* algorithm to solve following 8-puzzle problem. **[10]**

Initial State

Goal State

1	2	3
7	8	4
6		5



1	2	3
8		4
7	6	5

b) Write a script for withdrawal of money from a Bank. **[8]**

OR

P.T.O.

Q4) a) Explain alpha and beta cutoffs in Minmax algorithm with proper examples. [10]

b) Apply Constraint Satisfaction to solve LOGIC + LOGIC = PROLOG by assigning single digit unique integer number to the alphabets. [8]

Q5) a) Explain semantic analysis phase in Natural Language Processing. [8]

b) How does Resolution help to satisfy the goal. Explain in detail. [8]

OR

Q6) a) Give the typical ATN representation to accept assertive English statements. [10]

b) Write the notes on JTMS. [6]

SECTION-II

Q7) a) Consider the following representation from blocks world,

Start: $ON(A, D) \wedge ON(C, A) \wedge ONTABLE(D) \wedge ONTABLE(B)$

Goal: $ON(C, D) \wedge ON(B, C) \wedge ON(A, B) \wedge ONTABLE(D)$

Show how strips would solve this problem? [12]

b) Explain how AI can be used in visual perception. [6]

OR

Q8) a) What is Hierarchical planning? Illustrate with example. [8]

b) What are trihedral objects? Explain Waltz's algorithm to label a trihedral object. [10]

Q9) a) What is an Expert system? Explain with an example. [8]

b) Explain Supervised, Unsupervised and Reinforcement learning in ANN? [8]

OR

- Q10)a)** What is Perceptron Learning in ANN? Explain in detail. [8]
b) Explain Expert system to diagnose childhood diseases. [8]

- Q11)a)** Write a note on PROLOG's features to implement AI techniques. [10]
b) Write a note on Distributed AI. [6]

OR

- Q12)a)** Write a Prolog program to compute the Factorial of a number. [8]
b) Explain the use of cut in PROLOG with suitable examples. [8]



Total No. of Questions : 12]

SEAT No. :

P1785

[4859]-186

[Total No. of Pages : 4

B.E. (Information Technology)
c-COMPILER DESIGN
(2008 Pattern) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) With the help of the block diagram and example explain different phases of the compiler. **[10]**
- b) Write short note on Lex. **[6]**

OR

- Q2)** a) Write a LEX program to **[8]**
- i) Display occurrences of word 'computer' in text.
 - ii) Read a text and display total number of vowels and total word in it.
- b) Explain the role of lexical analyzer. Explain interaction between lexical analyzer and parser. Define lexeme, token and pattern with suitable example. **[8]**

Q3) For the following grammar

$S \rightarrow AaAb \mid BbBa$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

- a) Compute First and Follow. **[6]**
- b) Check whether grammar is LL(1). **[2]**

P.T.O.

- c) Construct Predictive parsing table. [6]
- d) Show sequence of parsing steps for the string [4]
- i) ab
- ii) ba

OR

Q4) Construct SLR parser for the grammar [18]

$D' \rightarrow D$

$D \rightarrow \text{type tlist};$

$\text{tlist} \rightarrow \text{tlist, id} \mid \text{id}$

$\text{type} \rightarrow \text{int} \mid \text{float}$

show the sequence of steps for the string float id, id;

Q5) a) What are SDD? Give SDD to translate expressions into syntax tree and draw syntax tree for $a * b - 5 + c$. [8]

b) Write three address sequences for the following:

i) switch (ch)

{

case 1: $a = b + c;$

Break;

case 2: $a = b - c;$

Break;

}

[4]

ii) while $x > y$ do

if $c < d$ then

$a = b * c$

else

$a = b / c$

[4]

OR

- Q6)** a) Write SDD for Do-while statement and explain with example. [8]
b) Differentiate between L-attributed definitions and S-attributed definitions. [8]

SECTION-II

- Q7)** a) Write short note on activation records with its components. [8]
b) Explain static and dynamic scope. Illustrate with examples. [8]

OR

- Q8)** a) Explain following parameter passing methods with suitable example. [8]
i) Call by value.
ii) Call by reference.
iii) Call restore.
iv) Call by name.
b) Explain following terms with suitable example. [8]
i) Control link.
ii) Access link.

- Q9)** a) Explain sethi-Ullman algorithm for code generation with example. [10]
b) Write Quadruple and Triple representation of following expression
$$x := y / - z - y / - z - y * z$$
 [8]

OR

- Q10)** a) With proper examples explain following optimizations: [10]
i) Constant propagation.
ii) Variable propagation.
iii) Strength reduction.
iv) Dead code elimination.
v) Common subexpression.
b) Discuss the various principle sources of Code optimization. [8]

- Q11)**a) Explain different features of object oriented programming with example. [8]
- b) Explain different types of polymorphism with examples. [8]

OR

- Q12)**a) Explain differences between class based language and object based language with example. [8]
- b) Explain different types of inheritance with example. [8]



Total No. of Questions : 12]

SEAT No. :

P1786

[4859]-187

[Total No. of Pages : 2

B.E. (Information Technology)
ADVANCED OPERATING SYSTEMS
(2008 Course) (Elective-I(d)) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain following UNIX commands with example Chgrp, Chown, Chmod, ftp. **[8]**

b) Explain any four system calls used for process management. **[8]**

OR

Q2) a) Differentiate between process control block and thread control block. Explain multithreading with example. **[8]**

b) Explain various primitives used for process synchronization. **[8]**

Q3) a) Explain the structure of PCB in KMOS. **[8]**

b) Explain the data structures used by KMOS. **[8]**

OR

Q4) a) Explain process dispatching mechanism? Write functional specifications of process DISPATCH in KMOS. **[8]**

b) Give functional specifications of KMOSSTART and KMOSCLOCK. **[8]**

Q5) a) Differentiate between multitasking O.S. and multiprocessing O.S. What are the advantages of using multiprocessor systems? **[8]**

b) Explain the types of multiprocessor operating system with eg. **[10]**

OR

P.T.O.

- Q6)** Write short notes on following (Any Three): **[18]**
- a) Exokernel.
 - b) Multi tasking OS.
 - c) Design considerations of multiprocessing O.S.
 - d) Process Synchronization.

SECTION-II

- Q7)** a) Explain the concept of High memory mapping. **[8]**
b) Explain different components of slab allocator and give its significance. **[10]**

OR

- Q8)** a) Write pseudo C' code for kcalloc (), vmalloc and kfree () functions and explain their use. **[10]**
b) Explain the concept of statically allocating on the stack. **[8]**

- Q9)** a) Write a note on generalized device drivers. **[8]**
b) Explain the process of unification of files and I/O devices. **[8]**

OR

- Q10)** a) Explain various disk device driver access strategies. **[8]**
b) Explain the concept of I/O scheduler with eg. **[8]**

- Q11)** a) Explain the following system calls related with file system management: **[8]**
- i) Mount
 - ii) Unmount
 - iii) Link
 - iv) Lseek
- b) Explain the concept of file system abstraction. **[8]**

OR

- Q12)** a) Write a note on VFS. **[8]**
b) Explain the process of mapping of file blocks with relevant system calls. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3179

[Total No. of Pages :3

[4859]-188

B.E. (INFORMATION TECHNOLOGY)

Embedded System (Semester - I)

(2008 Pattern)(Elective -II)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *In section I attempt: Q.No. 1 or Q.No.2, Q.No. 3 or Q.No.4, Q.No. 5 or Q.No.6, In section II attempt :Q.No. 7 or Q.No.8, Q.No. 9 or Q.No.10, Q.No.11 or Q.No.12,*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume Suitable data, if necessary.*

SECTION-I

Q1) a) What are the design parameters of embedded systems? Explain. [8]

b) What do you mean by DSP, SoC and ASSP? [8]

OR

Q2) a) What are the embedded systems? Classify them. [8]

b) What are the different components of an embedded system? [8]

Q3) a) Explain different architectural features considered while selecting microprocessors or microcontrollers for an embedded system? [8]

b) What are the techniques of power management used while designing an embedded system? [4]

c) What are the types of memory selected and their typical size while designing the data acquisition system? [6]

OR

Q4) a) How a designer selects processor, EPROM and RAM required for a digital camera? [6]

b) What is UART? How is it useful in an embedded system? [6]

P.T.O.

- c) Explain the typical memory map for a small scale embedded application. [6]
- Q5)** a) Compare RS-232C and RS-425 communication protocols. [8]
- b) Describe SPI protocol in brief and the applications where it is preferred. [8]

OR

- Q6)** a) What is CAN protocol? Give its features and applications. [8]
- b) How does host recognize the device insertion in USB protocol? Explain in detail. [8]

SECTION-II

- Q7)** a) What are the different phases of software development cycle for a typical embedded system? [8]
- b) What are the different debugging tools available for embedded system programming [6]
- c) What are the advantages of using high level language instead of assembly language for embedded system programming? [4]

OR

- Q8)** a) Compare Java and C++ programming and their suitability for embedded systems. [6]
- b) What is cross compiler? Name one. How it is different than generic compiler? [6]
- c) With an example explain how stacks and queues are used to implement application functionality in embedded system software. [6]

- Q9)** a) What are the different characteristics of real time operating system? Give two example of RTOS. [6]
- b) With the help of neat diagram, explain cooperative scheduling model for RTOS. What is interrupt latency time for this scheduling model. [10]

OR

- Q10)** a) With the help of neat diagram, explain preemptive scheduling for RTOS. [8]

- b) Define and explain interrupt latency period. What is its significance in RTOS? [4]
- c) What is a mailbox? Give details. [4]

- Q11)**
- a) Differentiate MicroC/OS-II and VxWorks based on features and their area of application. [6]
 - b) With the help of neat system block diagram, explain the system requirements and tasks for adaptive cruise control system for a car. [10]

OR

- Q12)**
- a) How tasks are managed in MicroC/SO-II? Explain in detail. [8]
 - b) With help of neat diagram, explain synchronization of tasks and IPCs for vending machine application. [8]



Total No. of Questions : 12]

SEAT No. :

P1787

[4859]-189

[Total No. of Pages : 2

B.E. (Information Technology)
b-MOBILE COMPUTING
(2008 Course) (Elective-II) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Draw and explain basic cellular system and explain briefly various generations of mobile communication. [10]
- b) What are the three measurements used to decide handoff? What are distance dependent fading, shadow fading and Rayleigh fading? [8]

OR

- Q2)** a) Draw the general PCS architecture and explain it. [8]
- b) Explain hard hand off and soft hand off. Explain the procedure for adding and removing Base stations with MAHO soft hand off. [10]

- Q3)** a) Explain with diagram A3, A5 and A8 algorithm in GSM. [8]
- b) What are different types of addresses and identifiers used in GSM. [8]

OR

- Q4)** a) Compare the authentication procedure in IS-41 and GSM. [8]
- b) Explain VLR overflow and HLR failure restoration. [8]

- Q5)** a) Explain Mobile originated messaging and Mobile terminated messaging. [8]
- b) Draw and explain SMS protocol stack. [8]

OR

P.T.O.

- Q6)** a) What is number portability? Describe three types of number portability. [9]
b) Write short note on Billing and Charging mechanism in GPRS. [7]

SECTION-II

- Q7)** a) Explain Wireless Application Protocol (WAP) model in detail. [8]
b) Draw and explain international call set up procedure. [8]

OR

- Q8)** a) Explain GPRS architecture with neat diagram. [8]
b) Compare W-CDMA and CDMA 2000. [8]

- Q9)** a) Explain in detail IP packet delivery. [8]
b) Describe the goals and requirements of Mobile IP. [8]

OR

- Q10)** a) Explain various features and header format of IP v6. [8]
b) Explain Dynamic source routing in MANET. [8]

- Q11)** a) Explain in detail Wireless Broad Band (WiMAX) technology. [8]
b) Define Bluetooth. Explain in detail Bluetooth technology with protocol stack. [10]

OR

- Q12)** a) What are the advantages of Spread Spectrum technology? Explain with diagram Spread Spectrum Technology. [10]
b) Write a short note on (4 Marks Each): [8]
i) RFID.
ii) W-LAN.



Total No. of Questions : 12]

SEAT No. :

P1688

[4859]-19

[Total No. of Pages : 3

B.E. (Civil)

d-ADVANCED ENVIRONMENTAL MANAGEMENT

(2008 Course) (Semester-II) (Elective-III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) Discuss the following with respect to ISO 14000 series. **[3 × 6 = 18]**

- a) Background & development of the series.
- b) Principles & elements of the series.
- c) Environmental Management System Standard.

OR

Q2) a) Discuss the Importance of ISO 14000 series. **[9]**

- b) Discuss the ISO 14001. Environmental Management system standards. **[9]**

Q3) a) Discuss the salient features of water Act 1974 (P & CP). **[8]**

- b) Discuss the Important Provisions of Hazardous waste management & handling rules 1989. **[8]**

OR

P.T.O.

Q4) Write a short note on following:

- a) Air Act 1981 (P & CP). [8]
- b) MSW Rules, 2000. [8]

Q5) Thermal power plant burns 8000 TPD of Indian coal. Discuss the various air pollution control devices to be provided to limit SO₂ emissions within the CPCB standard. Also calculate the stack height requirements on the basis of SO₂ & particulate matter emissions. [16]

OR

- Q6)** a) Discuss how the metrological parameters affects the dispersion of air pollutants in the atmosphere. [8]
- b) Design a parallel type ESP with 10 channels to handle 10,000 m³/hr of gas for efficiency of [8]
- i) 90%.
 - ii) 99%.
 - iii) 99.9%.

SECTION-II

Q7) Discuss how will you carry out the treatability study for a trade effluent from active pharmaceutical industry. Also discuss the treatment options for the trade effluents. [18]

OR

- Q8)** a) Discuss in detail Biological nitrification denitrification for removal of nitrogen from wastewater. [9]
- b) Discuss the various methods of phosphorus removal from waste water. [9]

Q9) For a superspeciality hospital located in rural area, discuss how will you manage the solid waste and biomedical waste generated from the said hospital. [16]

OR

Q10)a) Discuss the Environmental hazards associated with the storage of hazardous chemicals. **[8]**

b) Discuss the Energy recovery from MSW. **[8]**

Q11) Discuss how the prediction of impact for Air, Water, Noise and Soil is done in EIA studies. **[16]**

OR

Q12)a) Explain the significance of Environmental audit report related to air, water and noise pollution from industries. **[8]**

b) Discuss the Environmental Impact Assessment of cement manufacturing industry. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1788

[4859]-190

[Total No. of Pages : 2

**B.E. (Information Technology)
c-MULTIMEDIA SYSTEMS
(2008 Course) (Semester-I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to two sections should be written in separate answer sheets.*
- 2) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I*
- 3) *Answer Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of calculator is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Explain goals and objectives of the multimedia system. Explain applications of multimedia. [6]
- b) Explain LZ and LZW text compression technique. [6]
- c) What are different text file formats? Explain any two in detail. [6]

OR

- Q2)** a) Explain distributed multimedia applications. [6]
- b) Explain ODA and OMF architecture. [6]
- c) What is multimedia authoring? State and explain various types of multimedia authoring tools. [6]

- Q3)** a) Elaborate on JPEG and BMP image file formats. [8]
- b) Explain Shannon-Fano algorithm with example. [8]

OR

- Q4)** a) Explain types of compression. Differentiate between intra frame and inter frame compression. [8]
- b) Explain image acquisition and enhancement. [8]

P.T.O.

- Q5)** a) Draw and explain nature of sound wave. Explain its characteristics. [8]
b) Explain any two audio file formats in detail. [8]

OR

- Q6)** a) Write short note on ADPCM. [8]
a) Explain different types of amplifiers. [8]

SECTION-II

- Q7)** a) Explain any two video signal format. [6]
b) Explain AVI and MOV video file format. [6]
c) Explain Laser Disc and VCD. [6]

OR

- Q8)** a) Write short note on HDTV and CIF. [6]
b) Explain DVCAN and Camcorder. [6]
c) Explain DVD formats. [6]

- Q9)** a) What is virtual reality? Explain applications of Virtual Reality. [8]
b) Write short note on VRML. [8]

OR

- Q10)**a) Explain 3D sound system. [8]
b) Write a short note on Virtual Reality chair. [8]

- Q11)**a) What is animation? Explain any three principles of animations. [8]
b) Explain morphing, Rotoscoping and flip book animation. [8]

OR

- Q12)**a) Explain animation using Flash. [8]
b) Write note on 3D animation. [8]



Total No. of Questions : 12]

SEAT No. :

P1789

[4859]-191

[Total No. of Pages : 3

**B.E. (Information Technology)
DISTRIBUTED SYSTEM
(2008 Course) (Semester-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What are the design challenges in design of Distributed Systems? [8]
- b) What is a middleware? Specify its need with examples of middlewares. [8]

OR

- Q2)** a) Explain following with respect to Distributed System: [8]
- i) Layered Architecture.
 - ii) Object-based Architecture.
 - iii) Data-centered Architecture.
 - iv) Event-based Architecture.
- b) What is heterogeneity? How to handle it in distributed systems. [8]

- Q3)** a) What is a Remote Method Invocation? How would you incorporate persistent asynchronous communication into model of communication based on RMIs to remote object? [10]
- b) What is marshalling and unmarshalling? How it is used in communication between a client and a server? [8]

OR

P.T.O.

Q4) a) What is LRPC? Describe the four techniques used in a LRPC system that makes more efficient than a conventional RPC system. [10]

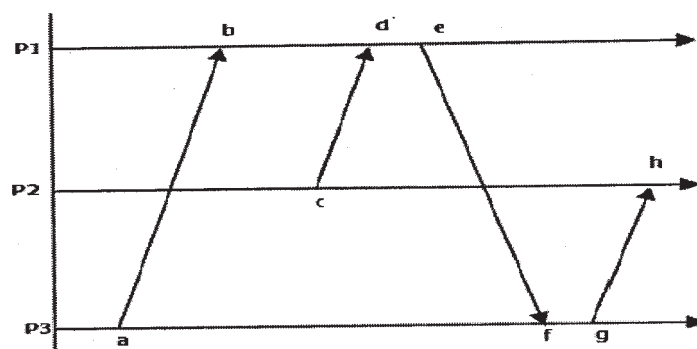
b) What are the challenges in designing and developing a multimedia streaming application. Describe in the context of Synchronization and coordination. [8]

Q5) a) Why real computer clocks are not useful in distributed systems. A clock of a computer system must never run backward. Explain how this issue can be handled in an implementation. [8]

b) Compare Centralized, Decentralized, Distributed and Token ring mutual exclusion algorithms. [8]

OR

Q6) a) Solve following timing diagram using Lamport's Logical Clock algorithm and Vector Time-stamp method both. [10]



b) What are the features of Network Time Protocol? Explain how NTP is useful to distributed time over the Internet? [6]

SECTION-II

Q7) a) What is automounter facility in NFS? How does the NFS Automounter help to improve the performance and scalability of NFS? [8]

b) Describe file sharing mechanism in CODA file system. [8]

OR

- Q8) a)** Explain following term with respect to Naming entities: [8]
- i) Names.
 - ii) Identifiers.
 - iii) Addresses.
 - iv) Name Spaces.
- b) Discuss security implementations in Network File System. [8]

- Q9) a)** What is Distributed Shared memory? What are the design issues in implementation of DSM? [8]
- b) What is Client centric consistency model? Explain in detail. [8]

OR

- Q10)a)** Explain PRAM consistency model and Weak Consistency model in detail. [8]
- b) What is the data centric consistency model? Explain in detail. [8]

- Q11)a)** What is the Byzantine general problem? If there are 'n' components, then what is the minimum requirement to take a decision in the presence of faulty components? [8]
- b) Explain following protocols: [10]
- i) One-Phase Commit.
 - ii) Two-Phase Commit.
 - iii) Three-Phase Commit.

OR

- Q12)a)** What is fault tolerance? How it increases reliability. [8]
- b) Explain why a multi-threaded server might not qualify as a state machine. [10]



Total No. of Questions : 12]

SEAT No. :

P1790

[4859]-192

[Total No. of Pages : 2

**B.E. (Information Technology)
INFORMATION RETRIEVAL
(2008 Course) (Semester-II) (414449)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss Luhn's idea and explain Conflation Algorithm with a suitable example. [10]
b) Explain the differences between Data Retrieval and Information Retrieval. [8]

OR

- Q2)** a) Enlist the algorithms used for clustering and explain Single pass clustering algorithm. [10]
b) Explain exhaustivity and specificity with respect to Index term weighting. [8]

- Q3)** a) Explain the Vector model in detail. [8]
b) Explain the different types of search strategies. [8]

OR

- Q4)** a) Explain Inverted Index file. How can it be used in Information Retrieval? [8]
b) Explain various IR models in detail with their advantages and disadvantages. [8]

- Q5)** a) Explain the need for Single Value Summaries and various strategies in detail. [10]
b) Discuss retrieval performance evaluation. [6]

OR

P.T.O.

- Q6)** a) What are digital libraries? [6]
b) Write short notes on: [10]
i) Online IR system.
ii) User oriented measures.

SECTION-II

- Q7)** a) Explain Collection Portioning, Source Selection and Query processing in distributed IR. [10]
b) State and explain the four parallel computing architectures. [8]

OR

- Q8)** a) Describe MIMD architecture with respect to parallel IR. How is Inverted file used in MIMD architecture? [10]
b) What is parallel computing? Discuss performance measures of parallel computing. [8]

- Q9)** a) How is image analysis and image access accomplished in MULTOS? [8]
b) Explain in detail GEMINI approach for multimedia IR. [8]

OR

- Q10)**a) What is Multimedia Information Retrieval? Discuss steps in Multimedia IR. [8]
b) Explain the feature extraction and distance function for 2D color image. [8]

- Q11)**a) What are Meta crawlers? Explain with a suitable example. [8]
b) Discuss different forms of searching the web with proper examples. [8]

OR

- Q12)**a) Explain the different components of web crawler. [8]
b) Write a note on web data mining. [8]



Total No. of Questions :12]

SEAT No. :

P1791

[4859]-193

[Total No. of Pages :3

B.E (Information Technology)

REAL TIME SYSTEM

(2008 Pattern) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Describe the classification of real time systems with suitable example. What are the issues in real time computing. [8]
- b) What are traditional performance measures of real time systems? Discuss the properties of traditional performance. [8]

OR

- Q2)** a) What are the various factors that are to be considered while estimating the program run time in real-time systems? Describe each in detail. [8]
- b) Explain with the block diagram the structure of the real-time system. [8]
- Q3)** a) What are the assumptions made by Rate Monotonic Algorithm? Explain the Rate Monotonic Algorithm with the help of suitable example. [10]
- b) What is priority Inversion problem? How do we overcome it? [8]

OR

P.T.O.

Q4) a) Determine which of following tasks is RM schedulable. [10]

Task	Execution Time	Period
1	4	20
2	10	40
3	40	80
4	10	100

b) Compare fixed priority and dynamic priority algorithm. Explain EDF Algorithm with the help of suitable example. [8]

Q5) a) Discuss the desired characteristics of Real time Language. [8]

b) Explain Main memory databases in detail. [8]

OR

Q6) a) What do you mean by concurrency control? Explain optimistic concurrency control. [8]

b) Explain AED algorithm in detail. [8]

SECTION - II

Q7) a) Describe timed token Protocol in detail. [10]

b) Discuss network architecture issues in real time systems. [8]

OR

Q8) a) Explain VTCSMA algorithm with the help of block diagram. [10]

b) Explain Polled bus protocol with the help of suitable example. [8]

Q9) Write short note on following mechanisms present in RTOS: [16]

a) Time services

b) Scheduling Mechanisms

OR

- Q10)a)** List and explain the capabilities of RTOS. [6]
- b) Discuss the following operating system functions with respect to real time systems. [10]
- i) Memory Management
 - ii) IO and Networking

- Q11)a)** Discuss how software redundancy helps to achieve faults tolerance. [8]
- b) Explain hardware reliability model with respect to permanent faults. [8]

OR

- Q12)a)** What are the causes of failure? Describe integrated failure handling. [8]
- b) Write short note on classification of faults. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1792

[4859]-194

[Total No. of Pages :3

B.E (Information Technology)
b:SOFTWARE ARCHITECTURE
(2008 Course) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer 3 questions from section I and 3 questions from section II.*
- 2) Answers to the two sections should be written in separate answer books.*
- 3) Figures to the right indicate full marks.*
- 4) Make suitable assumptions wherever relevant and appropriate.*

SECTION - I

Q1) a) How Architectures are influenced by System Stakeholders and the developing organization. **[9]**

b) Explain in details ramifications of influences on an Architecture. **[9]**

OR

Q2) a) What are the points which makes Good Architectures? **[9]**

b) Explain in details Software Structures. **[9]**

Q3) a) Explain and illustrate the following concepts (in context of quality attributes) with example: **[8]**

i) Quality Attribute Scenarios

ii) Availability Scenarios

b) Explain in details: **[8]**

i) Business Qualities

ii) Architecture Qualities

OR

P.T.O.

- Q4)** a) Write short note on following: [8]
i) Modifiability Tactics
ii) Usability Tactics
b) Give scenario for Security and Testability quality attribute. [8]

- Q5)** a) What can a Facade pattern do for us,. Illustrate with an example. [8]
b) With structure explain observer pattern. Give examples of the same. [8]

OR

- Q6)** a) What can a Mediator pattern do for us. Illustrate with an example. [8]
b) With structure explain Singleton pattern. Give examples of the same. [8]

SECTION - II

- Q7)** a) Compare Different architecture styles. [9]
b) Write short note on following: [9]
i) Coupling in XML.
ii) Structure of XML.

OR

- Q8)** a) Explain three tire architecture with reference with to presentation, business and persistence layers. [9]
b) Explain concept of: [9]
i) Loose coupling.
ii) Addressing quality attributes through multi tire architecture.
- Q9)** a) Explain EJB Architecture in detail. Describe entity, Session and Message beans in detail. [8]
b) Write short note on following: [8]
i) Web services
ii) Message Beans

OR

- Q10)a)** Explain Web Server in detail with example. [8]
- b) Explain with example: [8]
- i) Entity Beans
 - ii) Session Beans

- Q11)a)** Explain DLL Servers in detail. [8]
- b) Write short note on following: [8]
- i) Components and Interfaces.
 - ii) .Net Remoting.

OR

- Q12)a)** Describe .NET Architecture. What is role of CLR, CLS, CTS and CLI in it? [8]
- b) Write short note on following: [8]
- i) .NET assemblies
 - ii) .NET web services

EEE

Total No. of Questions :12]

SEAT No. :

P1793

[4859]-195

[Total No. of Pages :3

B.E (Information Technology)

c:ADVANCED GRAPHICS

(2008 Pattern) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer question 1 or 2, 3 or 4, 5 or 6 from section -I and question 7 or 8, 9 or10, 11 or12 from section -II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a) Explain in detail: [6]**
- i) Parallel Projection.
 - ii) Depth queing.
- b) Explain zero order, first order, second order parametric continuity in detail. [6]
- c) Explain following quadratic surfaces: [6]
- i) Ellipsoid.
 - ii) Torus.

OR

- Q2) a) Explain with mathematical model Bezier surface and B-Spline surface. [6]**
- b) What is Spline? What are the major differences between Bezier curve and B-Spline. [6]
- c) Explain polygon surface and polygon Meshes. [6]

P.T.O.

- Q3)** a) Explain the basic rules of animation in brief. [8]
b) Explain briefly various real time animation techniques used in computer assisted animation. [8]

OR

- Q4)** a) Which are the different animation software's? Explain any one animation software in detail. [8]
b) Write short note on: [8]
i) Frame-by-Frame Animation Techniques.
ii) Real Time Animation Techniques.

- Q5)** a) Differentiate various solid modeling methods on following points: [8]
i) Uniqueness.
ii) Compactness and efficiency.
iii) Accuracy.
iv) Domain.
b) Explain desirable properties in solid representation. [8]

OR

- Q6)** a) Explain primitive instancing method for solid modeling. [8]
b) Explain in detail Spatial-partitioning representation along with its decomposition. [8]

SECTION - II

- Q7)** a) Illustrate "Basic Ray Tracing Algorithm". [8]
b) Explain RGB, HSV color models. [6]
c) Explain Conversion between RGB and HSV color models. [4]

OR

- Q8)** a) Explain HLV & HLS color cones. [8]
b) Explain YIQ color model. How is YIQ to RGB conversion done? [6]
c) Explain any one color selection system with its application. [4]
- Q9)** a) Explain the scan conversion shadow algorithm. [8]
b) Compare Gouraud & Phong's method of shading. [8]

OR

- Q10)**a) Explain illumination W.R.T. Ambience, Specular reflection and diffuse reflection. [8]
b) What is rendering? Explain Monte-Carlo method for rendering. [8]
- Q11)**a) Explain the factors affecting the desing of virtual reality system. [8]
b) Explain driving simulation application and different virtual reality devices used in it. [8]

OR

- Q12)**a) What is meant by virtual reality system? Explain the applications of virtual reality system. [8]
b) What are different virtual reality languages. Explain any one in detail. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1794

[4859]-196

[Total No. of Pages :3

B.E (Information Technology)
d:ADVANCED COMPUTER NETWORKS
(2008 Course) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

SECTION - I

Q1) a) What are the Networking principles and Network services with Layered architecture? **[12]**

b) Explain in detail Internet, ATM and cell phone. **[6]**

OR

Q2) a) Explain the logical layers of ISO/OSI model in detail. **[12]**

b) Discuss in detail various principles of network design. **[6]**

Q3) a) What is Wireless communication and explain its architecture? **[8]**

b) Explain WDM system with diagram in optical Networks. **[8]**

OR

Q4) a) Explain the ATM header with appropriate diagram. Explain the structure of the header. **[8]**

b) Explain mobility management issues in wireless networks. **[8]**

P.T.O.

- Q5)** a) Explain Congestion control mechanism of ATM network w.r.t. [6]
i) Internal congestion control
ii) Global congestion control
b) Explain Markov Chain Models w.r.t. M/M/1 queue and M/M/2 queue. [10]

OR

- Q6)** a) Explain in details various parameters specified in the Quality of Service. [8]
b) Explain Congestion control and Flow control mechanism of Datagram network w.r.t. Open Loop and Closed Loop. [8]

SECTION - II

- Q7)** a) Explain different BGP messages with their formats. [10]
b) What are VPNs? Explain the significance of tunneling in VPNs. [8]

OR

- Q8)** a) Write notes on: [8]
i) BGP
ii) RIP
b) What is Traffic Engineering and explain TE with MPLS. [10]

- Q9)** a) Explain RTP and RSVP. [8]
b) Explain Application Programming Interface for IPv6. [8]

OR

- Q10)** a) Explain the general characteristics of Mobile IP. [8]
b) Explain various features of IPv6. [8]

Q11)a) Explain how firewall is implemented in the network. **[8]**

b) What are overlay networks? What is the importance of overlay networks?
[8]

OR

Q12)a) Explain cluster based network architecture for ad-hoc networks. **[6]**

b) What is ad hoc network? Explain its limitations and application areas.**[10]**

EEE

Total No. of Questions :12]

SEAT No. :

P1795

[4859]-197

[Total No. of Pages :3

B.E (Information Technology)
a: BIOINFORMATICS
(2008 Course) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from section - I and three questions from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn with labelled wherever necessary.*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Explain with neat diagram the central dogma of molecular biology. Explain the molecules participating in information flow and the various functional sites. **[10]**
- b) Discuss on Bioinformatics application in detail. **[6]**

OR

- Q2) a)** What is Baye's rule? Explain Baye's theorem applicable in biological system. Explain any two limitations of Baye's theorem. **[10]**
- b) Discuss any two public bioinformatics database with appropriate examples. **[6]**
- Q3) a)** What is Microarray? Define it. Explain the sources of variability in microarray preparation and reading. Explain how statistical analysis can be used to reduce variability. **[8]**
- b) Enlist and discuss any two different computational methods of sequence alignment. **[8]**

OR

P.T.O.

Q4) a) Differentiate between classification & clustering. Discuss in brief the Kmean clustering with an example. [8]

b) Explain any two machine learning processes. [8]

Q5) a) Define data mining. State and explain various data retrieval tools in Bioinformatics. [10]

b) Explain various representation of nucleotide sequence along with their particular uses and application. [8]

OR

Q6) a) Explain methods of computational sequence alignment: [10]

i) Dynamic programming

ii) Dot matrix method

b) What is pattern matching? Discuss different methods for pattern matching. [8]

SECTION - II

Q7) a) Explain synchronous and Asynchronous collaboration with an appropriate examples. [10]

b) Explain the process of Drug discovery. What high-throughput screening methods are employed in screening drugs. [8]

OR

Q8) Explain the methods of protein structure prediction and determination: [18]

a) Experimental

b) Ab- initio

c) Heuristic

- Q9)** a) Explain the difference in the approach of BLAST and FASTA. [8]
b) Explain FASTA algorithm. What FASTA programs are available for sequences. [8]

OR

- Q10)** a) Explain BLAST algorithm in detail with neat diagram. [8]
b) Explain FASTA and the recommended steps for a FASTA search. [8]
- Q11)** a) Write short notes on: [8]
i) HMM
ii) Neural network
- b) Explain various applications of Genetic Engineering. [8]

OR

- Q12)** a) What are the natural causes of degradation of ecosystem? [8]
b) Define Biotechnology. What is significance of environmental Biotechnology. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1796

[4859]-198

[Total No. of Pages :3

B.E (Information Technology)

b:NEURAL NETWORK AND EXPERT SYSTEMS

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from section - I and three questions from section - II.*
- 2) *Answers to the two sections should be written in separate answer - books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Compare the performance of a computer and that of a biological neural network in terms of speed of processing, size and complexity, storage, fault tolerance and control mechanism. **[9]**
- b) With the help of suitable diagram discuss functioning of a simple artificial neuron. Explain how the functionality is affected if two such neuron are connected in series. **[8]**

OR

- Q2) a)** With neat diagram explain properties of basic architectures of neural networks. **[8]**
- b) Draw and explain Roseblatt's perception model of a neuron. Write the equation which describes the operation of the perception model of a neuron. **[9]**
- Q3) a)** What is conjugate gradient method? Comment on the performance of he conjugate-gradient method? **[9]**
- b) What do you understand by the following terminologies? **[8]**
- i) Nearest neighbor recall and interpolative recall.

P.T.O.

- ii) Stability and Convergence.
- iii) Equilibrium state, Stable state and Steady state.
- iv) Fixed point stability, oscillatory stability and chaotic stability.

OR

- Q4)** a) Demonstrate with algorithmic steps and formulations EBP algorithm on MLFFNN. **[8]**
- b) Comment on the following issues of EBP: **[9]**
- i) Features,
 - ii) Performance
 - iii) Limitations
- Q5)** a) Explain how support Vector Machine is used for pattern classification and regression? **[8]**
- b) What is basic concept of Relevance Vector Machines? Explain how it is used in classification problems? **[8]**

OR

- Q6)** a) What is significance of “Regularization Theory”? In what way it is related with RBF networks. Analyze. **[8]**
- b) What do you understand by “Kernel” methods for Pattern Analysis? **[8]**

SECTION - II

- Q7)** a) What are the salient features of Kohonen’s self-organizing learning algorithm. **[9]**
- b) Explain with Diagram: **[8]**
- i) Pattern clustering and
 - ii) Feature Mapping

OR

- Q8) a)** What do you understand by the following: [9]
- i) Stochastic Update,
 - ii) Thermal Equilibrium
 - iii) Simulated Annealing
- b) Explain with neat diagram “Recurrent Neural Networks”. [8]
- Q9) a)** What are the advantages in keeping knowledge base separate from control module in knowledge based system? [8]
- b) Identify and describe an application area to design an Expert System. [8]

OR

- Q10)a)** Explain with neat diagram blackboard system architecture and its components. [8]
- b) What is uncertainty? Explain two approaches that deal with uncertainty problem. [8]
- Q11)a)** List and explain Expert system building tools. [9]
- b) Write a short note on E-MYCIN. [8]

OR

- Q12)a)** What do you mean by knowledge Engineering? Explain various stages of knowledge acquisition. [9]
- b) Write a short note on DENTRYL. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1797

[4859]-199

[Total No. of Pages :3

**B.E (Information Technology)
c:GEO INFORMATICS SYSTEM
(2008 Pattern) (Elective - IV) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer - books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What is image registration? Explain logarithmic and exponential contrast stretch in detail? **[8]**

b) Explain A to D conversion process in digital image processing of remotely sensed data? **[8]**

OR

Q2) a) What is image preprocessing? Explain in detail with example? **[8]**

b) Explain visual interpretation technique to be applied on digital images? Explain all the basic element of image interpretation with example. **[8]**

Q3) a) Define remote sensing? With the help of a block diagram explain the steps involved in remote sensing? **[8]**

b) Explain the radar principal with required formula? What are the factors affecting microwave? **[10]**

OR

Q4) a) What are the different groups of earth resource satellites? Name the satellites in each group and mention their tasks? **[6]**

b) Draw the wave model of electromagnetic radiation? Explain radar scattering mechanism? Differentiate between basic principles of SAR and SLAR? **[12]**

P.T.O.

- Q5)** a) Define GIS and explain the architecture of GIS system? [10]
b) Explain map projections used in GIS? Write with example types of maps. [6]

OR

- Q6)** a) Give reasons for using computers in the process of making maps? [8]
b) What is entity and field in GIS? How entity and field is modeled in GIS? Elaborate with example. [8]

SECTION - II

- Q7)** a) Explain in detail the process of affine transformation? [8]
b) What are the sources of errors in GIS? [8]

OR

- Q8)** a) Explain topological error and location error? [8]
b) Explain attribute data and attribute table in context of GIS? [8]

- Q9)** a) What are different techniques of graphic representation of spatial data exploration? [8]
b) Elaborate overlay and buffering in the context of vector data representation with example. [10]

OR

- Q10)** a) What are neighbourhood operations and zonal operations in context of raster data representation? [6]
b) Compare raster and vector data analysis? [6]
c) What are the types of GIS queries. Elaborate? [6]

- Q11)a)** Explain how GIS is used in Major river valley projects? [10]
- b) Explain hybrid database model of GIS in detail. [6]

OR

- Q12)a)** Discuss the implementation issues of GIS project? What tests will be performed in evaluating any GIS project? [10]
- b) Explain the software model useful for a GIS project design? [6]

EEE

Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 4

P1675

[4859]-2

B.E. (CIVIL)

DAMS AND HYDRAULIC STRUCTURES

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator & steam table is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What are the different types of arch dams? Explain any one. **[4]**
- b) Explain the maintenance and strength of dam. **[6]**
- c) Classify dam based on. **[6]**
- i) Construction material
 - ii) Purpose
 - iii) Hydraulic design

OR

Q2) Write short notes on: **[4X4=16]**

- a) Economic height of dam.
- b) Silting of reservoir.
- c) Explain uplift cell clinometer.
- d) Explain strainmeter.

P.T.O.

Q3) Check the stability of gravity dam for reservoir full conditions. Considering wt. of dam, water pressure and full triangular uplift pressure a gravity dam 70m height, top width 7m, bottom width 60m. The face exposed to water has slope of 1H:10V after a distance of 30m from top. The freeboard is 3m. The downstream face has slope of 0.7H to 1V, after a vertical distance of 13m from top.

Take specific wt of concrete = 24 KN/m³.

Coefficient of friction = $\mu=0.7$

Shear strength of concrete = 1400 kN/m². **[18]**

OR

Q4) a) Explain various measures adopted to reduce reservoir losses. **[6]**

b) Explain the zone method of design of gravity dam. **[6]**

c) Explain with sketch how you will find the uplift pressure on a gravity dam with drainage gallery. **[6]**

Q5) a) A cross section of homogeneous earth dam is drawn to a scale of 1cm=25m

Following results were obtained on trial slip circle **[8]**

Area of N diagram = 4863 kN

Area of T diagram = 1831 kN

Area of V diagram = 1200 kN

If radius of slip circle is 53.5 m and angle of arc is 58°.

Soil properties are cohesion = 24 kN/m³.

Angle of internal friction = 25°.

Determine factor of safety of slopes.

b) Explain with sketch chimney drain. **[4]**

c) What do you understand by construction pore pressure in earth dams & how they are determined. **[4]**

OR

Q6) a) Briefly discuss causes of failure of earthen dam. **[8]**

b) Bucket type energy dissipator. **[4]**

c) Syphon spillway. **[4]**

SECTION - II

Q7) a) A ogee type spillway has 12 crest gates each having 10m clear span. Find the max flood that can be safely passed by lifting all the gates when the maximum reservoir level is 105.00m & crest level is 101.00m.

Take coeff. $C=2.16$

Coeff. of end contraction of piers =0.05

Coeff. of contraction for abutment =0.1

Neglecting the velocity of approach.

Also design the downstream profile of this spillway of gravity dam having downstream face slope 0.7H: 1V. [8]

b) Briefly explain diversion head works with sketches. [5]

c) Explain lanes weighted creep theory. [5]

OR

Q8) a) Discuss the various types of energy dissipater used below spillway in relation to the position of tail water depth and jump height curve. [8]

b) Explain vertical lift gate or Rectangular gate. [5]

c) Explain necessity of inspection, maintenance and safety of spillway gates. [5]

Q9) a) Check whether following canal parameters conform to Kennedys theory of canal design.

Full supply discharge = 45 m²/s.

Full slope depth =1.8m

Bed slope of channel = 1 in 4000

Side slopes = 1H : 2V Bed width =30m

Critical velocity ratio = 1.17

Mannings constant $n=0.0225$ [8]

b) What is meant by cross drainage works? State the types of cross drainage works and explain any one with neat sketch. [8]

OR

Q10)a) Design an irrigation channel in alluvial soil according to Lacey's theory for the following data. [8]

Full supply discharge = $50 \text{ m}^3/\text{s}$.

Lacey's silt factor = 1.00

Side slope of channel = $\frac{1}{2}$ H: 1 V

b) Write short notes on [8]

i) Rapid falls

ii) Notch falls

iii) Stepped falls

iv) Glacis type falls.

Q11)a) What is cut off? Describe briefly how a cut off may be used as a river training measure. Also describe pitched is land. [8]

b) What is meant by hydropower? What are different types of hydropower plants and explain any one with a neat sketch. [8]

OR

Q12)a) i) Necessity of river bank protection and types of work for such protection.

ii) Spur Gyrones as types of river training work. [8]

b) Define the terms. Load factor, Power factor, Utilization factor, plant factor. [8]



Total No. of Questions : 12]

SEAT No. :

P1689

[4859]-20

[Total No. of Pages : 3

B.E. (Civil)

**CONSTRUCTION MANAGEMENT
(2008 Course) (Semester-II) (Elective-III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Write various components of infrastructure sector and explain their Contribution towards the development of smart city. [9]
- b) What do you mean by PMC? Explain its role in case of construction of waste water treatment plant. [9]

OR

- Q2)** a) What is project overrun? Explain with the example how it is occurred and what is its effect? [9]
- b) Discuss with example construction project monitoring system and also highlight role of communication in monitoring process. [9]
- Q3)** a) Explain with example where LOB is useful. [5]
- b) What work breakdown structure? Draw WBS for construction of township project. [6]
- c) What is string diagram? Discuss their importance. [5]

OR

P.T.O.

- Q4)** a) Discuss objectives of work study with examples. [6]
b) Define scheduling and explain in detail different methods of scheduling. [6]
c) Explain Time and motion studies. [4]

- Q5)** a) List different labor laws applicable to construction industry and explain any two in detail. [8]
b) Define working capital and explain with reference to Smart City how fund/finance is raised for construction. [8]

OR

- Q6)** Write short note on: [16]
a) Project balance sheet.
b) Interstate Migrant Workers Act.
c) Need and importance of labor laws.
d) Profit and loss account.

SECTION-II

- Q7)** a) What is risk management in construction industry? Using an example of a highway project explain different risks likely to be occur during all different phases of the project. [12]
b) Discuss the crucial factors that affect the energy consumption in building. [6]

OR

- Q8)** a) Define value and value engineering. Write in detail steps involved in the application of value engineering. [10]
b) Discuss the role of insurance in construction risk management. [8]

- Q9) a)** Discuss the role of vendor management in materials management process. **[8]**
- b) How performance appraisal and job evaluation is done in construction industry with example of site engineer? **[8]**

OR

- Q10)a)** What are the advantages and disadvantages of early and late procurement of construction material? **[6]**
- b) Explain role of ERP in construction materials management. **[4]**
- c) Describe procedure suitable for employment in large scale construction Industry. **[6]**

- Q11)a)** What is AI? Discuss how it is useful in construction management with the example of RMC plant/Fleet Management System. **[10]**
- b) Explain with sketch elements of a biological neuron and how its analogous with artificial neuron? **[6]**

OR

- Q12)a)** Discuss the applications of ANN, Genetic algorithm and Fuzzy Logic in Construction Management. **[12]**
- b) Explain the components of Fuzzy system. **[4]**



Total No. of Questions :12]

SEAT No. :

P1798

[4859]-200

[Total No. of Pages :2

B.E (Information Technology)
d : i -BUSINESS INTELLIGENCE (Open Elective)
(2008 Course) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Draw neat diagrams wherever necessary.*
- 2) *Assume suitable data, if necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain with the help of diagram data warehouse. Explain different components of data warehouse. **[8]**

b) Explain with the help of examples on-line transaction processing (OLTP). **[8]**

OR

Q2) a) Compare OLTP and OLAP. **[8]**

b) Explain the role of data warehouse in business intelligence. **[8]**

Q3) a) Explain star, snowflake and fact constellation schema. **[8]**

b) Explain different types of facts. **[8]**

OR

Q4) a) Explain parent-child and many-many relationship. **[8]**

b) Explain recurring and accumulating snapshots. **[8]**

Q5) a) What are metadata, data cubes and marts? **[9]**

b) Explain architecture of ETL. **[9]**

OR

P.T.O.

- Q6)** a) What is loading of data in data warehouse? Explain initial and incremental loading. [9]
- b) Explain staging and loading in detail. [9]

SECTION - II

- Q7)** a) Explain ROLAP, MOLAP and HOLAP. [8]
- b) Explain the use of different layers in reporting. [8]

OR

- Q8)** a) What are table-based and materialized views? [8]
- b) Explain ETL scheduling. How is data-level security implemented? [8]

- Q9)** a) Can data mining techniques be applied to text data? What are the different issues in handling text? [8]
- b) Differentiate between in-memory and in-database analytics. [8]

OR

- Q10)**a) What is regression? Explain predictive analysis. [8]
- b) What is unsupervised learning? Explain k-means algorithm. [8]

- Q11)**a) Explain agile BI. [9]
- b) Write a note on Pentaho. [9]

OR

- Q12)**a) Explain change data capture. Explain the significance of log-based techniques important? [9]
- b) Explain various features of Netezza and Teradata. [9]

EEE

Total No. of Questions :12]

SEAT No. :

P1799

[4859]-202

[Total No. of Pages :3

B.E (Computer Engg.)
DESIGN & ANALYSIS OF ALGORITHMS
(2008 Course) (410441) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Prove by contradiction: There exist two irrational numbers x and y such that x^y is rational. [8]
- b) Write an algorithm for Merge Sort. State its time complexity. [6]
- c) Explain the Greedy Kruskal's minimum spanning tree. [4]

OR

- Q2)** a) Consider the following instances of knapsack problem. $n=3$, $m=20$, $(p_1, p_2, p_3) = (25, 14, 15)$ and $(w_1, w_2, w_3) = (18, 15, 10)$. Find the feasible solutions using greedy method. [8]
- b) Explain a control abstraction for divide and conquer strategy. Write the recurrence relation for quick sort. [6]
- c) Explain the different ways of measuring the running time of an algorithm. [4]
- Q3)** a) With respect to dynamic programming explain the following: [8]
- i) Principle of Optimality
 - ii) Optimal substructure
- b) State multistage graphs problem and explain how it can be solved using forward approach. [8]

OR

P.T.O.

Q4) a) Explain Travelling Salesperson problem using dynamic programming with example. Specify its complexity. [8]

b) Let $n=3$ and $(k_1, k_2, k_3) = \{\text{do, if, while}\}$ [8]

Let $p(1:3) = \{0.5, 0.1, 0.05\}$

Let $q(0:3) = \{0.15, 0.1, 0.05, 0.05\}$

Compute and construct OBST for above values.

Q5) a) Write an algorithm to solve 8-Queens problem using backtracking method. [8]

b) Explain the difference between FIFO and LC branch-and-bound solution to 0/1 knapsack. [8]

OR

Q6) a) Write recursive backtracking schema for m coloring of the graph. Determine the time complexity of the same. [8]

b) Explain how branch and bound method can be used to solve travelling salesperson problem. [8]

SECTION - II

Q7) a) Explain how Directed Hamiltonian Cycle (DHC) reduces to travelling salesperson decision problem (TSP). [6]

b) Show that the job sequencing with deadlines problem is NP-hard. [8]

c) What are non-deterministic problems? Explain classes NP-hard and NP-complete. [4]

OR

Q8) a) Show that partition reduces to minimum finish time preemptive job shop schedule. [6]

b) Explain NP-Hard scheduling problem with example. [6]

c) State and explain Cook's Theorem. [6]

- Q9)** a) Write an algorithm for prefix computation. Determine its time complexity. [8]
- b) Explain how graph problems can be solved on parallel processors. [8]

OR

- Q10)** a) Write and explain pointer doubling algorithm with suitable example. [8]
- b) How merge sort algorithm can be implemented on multiprocessors? Explain it with an example. [8]
- Q11)** a) Explain the sequential and parallel technique for solving the convex Hull problem? [8]
- b) What is meant by heuristic algorithms? Explain any one heuristic search algorithm. [8]

OR

- Q12)** a) Explain resource allocation algorithm with deadlock avoidance. [8]
- b) Explain Huffman coding algorithm with example. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1800

[4859]-203

[Total No. of Pages :4

B.E. (Computer Engineering)
PRINCIPLES OF COMPILER DESIGN
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain role of lexical analyzer in compilation process. Also explain how lexical errors are identified. [6]
- b) Construct predictive parsing table for following grammar. Verify your answer by showing the parser steps for a valid string of grammar. [8]
- $P \rightarrow St$
 $S \rightarrow q ABC$
 $A \rightarrow a \mid bb D$
 $B \rightarrow a \mid \epsilon$
 $C \rightarrow b \mid \epsilon$
 $D \rightarrow c \mid \epsilon$
- c) Discuss how parsing techniques are classified? Support your answer with example. [4]

OR

- Q2)** a) Discuss various design issues related to compiler. [4]
- b) Construct SLR parsing table for following grammar: [8]
- $S \rightarrow x A y \mid x B y \mid x A z$
 $A \rightarrow a S \mid q$
 $B \rightarrow q$
- Verify your answer by showing parser steps for a valid string of grammar.
- c) Explain Recursive Descent Parser with example. Will Recursive Descent Parser work with ambiguous grammar? [6]

P.T.O.

- Q3)** a) What is role of semantic analyzer in compilation process? [4]
- b) Differentiate between synthesized attributes and inherited attributes. By taking example of declarative statement in 'C' language, explain how inherited attributes are used with bottom-up parser. [6]
- c) Explain following terms in brief: [6]
- i) Type checking
 - ii) Type expression
 - iii) Type coercion

OR

- Q4)** a) What is syntax directed translation? What are its advantages? [4]
- b) Given following grammar for Pascal style declaration. [8]
- $$D \rightarrow L : T$$
- $$L \rightarrow L, id \mid id$$
- $$T \rightarrow integer \mid real$$
- Add semantic actions for adding type of identifier in the symbol table. Draw the parse tree and annotated parse tree for the sentence
- a, b, c : real
- c) What is type conversion? How semantic analyzer accommodates type conversion? Explain with example. [4]

- Q5)** a) Explain syntax directed translation scheme for Boolean expression. Generate intermediate code for following statement using the above scheme. p and q or x and y [8]
- b) Differentiate between triples and indirect triples. Give proper example. [4]
- c) Explain the support given by LEX and YACC tools for generating intermediate code. [4]

OR

- Q6)** a) Translate following code fragment into three address statements. Represent these three address statements in quadruple format. [8]
- b) Write syntax directed scheme for simple assignment statement. Generate intermediate code for statement $a = b + c * d$ using this scheme. [6]
- c) What is use of marker non terminal in syntax directed translation scheme. [2]

SECTION - II

- Q7)** a) Which are different data structures used for symbol table? Discuss in detail. [6]
- b) Define activation record. Explain with example the elements of activation record. [6]
- c) Explain the difference in storage organization and allocation strategies for block-structured and non-block structured languages. [6]

OR

- Q8)** a) Discuss storage organization and allocation strategies. [6]
- b) Explain run-time management of variable length data. [6]
- c) Explain following:
Call by Value, Call by Name, Call by Reference [6]

- Q9)** a) With proper example, explain the process of generating code from labeling tree. [8]
- b) What is DAG? Explain its use in code generation. Generate DAG for following three address statements. [8]

$$T_1 = A + B$$

$$T_2 = C + D$$

$$T_3 = E - T_2$$

$$T_4 = T_1 - T_3$$

OR

- Q10)**a) What are various issues related to code generation? [4]
b) With suitable example explain basic blocks and flow graph. [4]
c) Write short notes: Peephole optimization, code generator. [8]
- Q11)**a) Explain fundamental data flow properties. [8]
b) Explain following optimizations with examples: [8]
i) Common subexpression elimination
ii) Code movement
iii) Variable propagation
iv) Strength reduction

OR

- Q12)**a) Compare quadruples, triples and indirect triples with respect to their use in code optimization. [6]
b) What are induction variables? Explain with example how induction variables help in loop optimization. [6]
c) Explain in brief: Live variable analysis. [4]

EEE

Total No. of Questions : 12]

SEAT No. :

P1801

[4859]-204

[Total No. of Pages : 3

B.E. (Computer Engineering)
OBJECT ORIENTED MODELING AND DESIGN
(2008 Pattern)(Semester-I)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION-I

Q1) a) Explain in brief: **[8]**

- i) RUP
- ii) MDA

b) Explain the following in the Basic Building Block of the UML 2.0. **[8]**

- i) Things
- ii) Relationships

OR

Q2) a) Explain in brief: **[8]**

- i) UML metamodel
- ii) Extensibility Mechanism

b) Explain 4+1 architecture. **[8]**

Q3) a) Explain different types of relationships used in use case diagram with relevant examples. **[8]**

b) A student applies for admission to a college. He can join one of the engineering branches. The student applications are sorted on merit. Top students are offered and admission on merit order. The joining process involves student being shown available branches. Student's selects branch, chooses optionally a hostel seat. In parallel makes payments, selects memberships to gym and select elective courses to attend. On successful admission he is enrolled, given a admit card and is given a copy of academic calendar. The students not admitted can register their interest in waitlist. Make additional assumptions about scope, use advanced activity diagram 2.0 features if relevant. **[8]**

OR

P.T.O.

- Q4)** a) What are functional requirements & how are they depicted in use case diagram? Elaborate with example for Library management system. [8]
- b) Explain control nodes and Object nodes in Activity diagram. [8]
- Q5)** a) Explain the significance of composite structure diagram? [6]
- b) Explain Aggregation and composition with example? [6]
- c) Draw a class diagram for Digital Library access system. Use all advanced notations for the same. [6]

OR

- Q6)** a) Explain Importing , Accessing and Merging in the Package Diagram.[6]
- b) Draw package diagram for multi-layered web architecture representation. It contains several packages like webservers, data servers, business servers. Each packages contains subpackages like exceptions, files etc... Higher level packages depend on lower level packages. Packages belonging to the same level could depend on each other. [6]
- c) Draw a class diagram for inventory control system. Assume suitable scope.[6]

SECTION-II

- Q7)** a) Consider the scenario: Facebook (FB) user could be authenticated in a web application to allow access to his/her FB resources. Assume suitable scope and draw a sequence diagram with all advanced notations. [6]
- b) Explain the Timing diagram with suitable example. [6]
- c) What are the history states? Explain with example. [6]

OR

- Q8)** a) What are different types of messages in sequence diagram? [6]
- b) Explain the significance of Interaction Overview Diagram and Communication Diagram. [6]
- c) Draw state chart diagram for VCR recorder. System will allow for automatic recording and manual recording. [6]

- Q9) a)** Draw a deployment diagram for Admission procedure system. It's a centralized system which deals with a central server at university. [8]
- b) Define component. Explain the significance of component diagram in modeling a system with appropriate example. [8]

OR

- Q10)a)** What is an Interface? Explain the different type of Interfaces and their representation? [8]
- b) Identify any two possible components and the interfaces they support for a hypothetical typical college library system that issues (returns) books to student members. The students can search for the books details as well as check availability. Draw a Component diagram to show the two identified components with interfaces they support. [8]

- Q11)a)** Explain Singleton, Abstract Factory and Façade Design pattern. [8]
- b) How do you forward engineer a class diagram? Explain with example. [8]

OR

- Q12)a)** What is Design Pattern and Explain its Type. [8]
- b) What is reverse engineering. Write a piece of code in C++ which depicts inheritance and also draw its UML representation. [8]



Total No. of Questions : 12]

SEAT No. :

P1802

[4859]-205

[Total No. of Pages : 2

B. E. (Computer)

a - IMAGE PROCESSING

(2008 Course) (410444) (Semester-I) (Elective-I)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer any three Question from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) Explain any one technique for image acquisition in detail? [10]
b) What are the ways of representation of image? Explain? [6]

OR

- Q2)** a) Define Brightness and Contrast of an image? Also explain two phenomena related to the perceived brightness of an image? [10]
b) Discuss in detail the orthogonal transform? [6]

- Q3)** a) What is color space? Mention various types of colour spaces with their specific applications? [8]
b) Describe the photographic model properties and their relation to image processing application? [8]

OR

- Q4)** a) Define image sampling and quantization and explain the process of Digital Image Formation? [8]
b) Define Histogram of an image? Plot and explain the nature of histogram for the following image's [8]
i) High Brightness image
ii) Low brightness image
iii) Low contrast image
iv) High contrast image

P.T.O.

Q5) Write short notes on: **[18]**

- a) Square Error Restoration Technique
- b) Homomorphism Filtering
- c) Histogram Equalization

OR

- Q6)** a) Describe Image Enhancement and write a pseudo code of obtaining the negative of an image? **[8]**
- b) Explain the types of image segmentation? What is histogram thresholding technique? **[10]**

SECTION-II

- Q7)** a) Explain 'Wiener Filter' with reference to image Restoration? **[8]**
- b) How Edge detection operator are applied to a real time application? Explain in detail. **[8]**

OR

- Q8)** a) Compare Image Enhancement with Image Restoration? **[8]**
- b) Explain Huffman coding for image compression considering an example? **[8]**
- Q9)** a) Write pseudo code for converting RGB image to HSI ? **[8]**
- b) Draw and explain image compression system block diagram? **[8]**

OR

- Q10)** a) Explain various noise models occurring in an image? **[8]**
- b) Explain the morphology technique used in image processing? **[8]**
- Q11)** a) Explain conceptually any two application of image processing in real time situation. **[9]**
- b) What is the role of Image processing in multimedia domain? **[9]**

OR

- Q12)** a) Write short note on water Marking? **[8]**
- b) Explain with the help of block diagram the steps required for remote sensing applications of an image processing. Also suggest the algorithm for each block? **[10]**



Total No. of Questions : 12]

SEAT No. :

P1803

[4859]-206

[Total No. of Pages : 3

B.E. (Computer Engineering)

b - DESIGN AND ANALYSIS OF COMPUTER NETWORKS

(2008 Course) (Semester-I)(Elective-I) (410444)

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*

SECTION-I

- Q1)** a) What is arrival statistics and service statistics in M/M/1 system. Explain Markov chain formulation. **[9]**
- b) Message arrives independently to a system at the rate of 10 pm. Their length is exponentially distributed with an average of 3600 characters. They are transmitted on a 9600 bps channel. A character is 8 bit long. **[9]**
- i) What is average service time , arrival rate, service rate?
 - ii) What are the average number of message in queues & number of message in queue?

OR

- Q2)** a) Telephone company establishes a direct connection between two cities expecting Poisson traffic with rate 30 calls/min. The durations of calls are independent and exponentially distributed with mean 3 min. The inter arrival times are independent of call durations. How many circuits should the company provide to ensure that an attempted call is blocked (because all circuits are busy) with probability less than 0.01? It is assumed that blocked calls are lost(i.e., blocked calls are not attempted again). **[9]**
- b) Describe exponential random variable and memoryless property of random variable? **[9]**

P.T.O.

- Q3)** a) Explain physical and logical designing issues of Network Backbone? [8]
b) Explain hierarchical and collapsible network architecture? [8]

OR

- Q4)** a) What is switch fabrics? Why a third generation switch fabrics does provides more bandwidth than second generation switch? [8]
b) List and explain common resources used in system design with their metrics. [8]

- Q5)** a) A computer on 6 Mbps network is regulated by token bucket. The bucket is filled at the rate of 1Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the fill 6 Mbps? [8]
b) Explain the rate controlled scheduling for generated service connection? [8]

OR

- Q6)** a) Explain in details ATM forum end-to-end rate controlled scheme and credit based schemes of closed loop flow control. [8]
b) Explain WFQ ? What is the advantage of worst case fair weighted fair queuing (WF²Q) over WFQ? [8]

SECTION-II

- Q7)** a) Explain leaky -bucket regulator with help of diagram? [8]
b) What is QOS? Explain different approaches to improve QOS? [8]

OR

- Q8)** a) Explain, what are the different time scale and mechanism used at these time scale for traffic management? [8]
b) What is peak-load pricing? Explain if peak-rate allocation is reasonable for data traffic? [8]

- Q9)** a) Explain expanded tries scheme in details? [8]
b) What is IP trace back? What is IP trace back evaluation schemes? Explain its implication and challenges? [8]

OR

- Q10)a)** Divide a network 192.168.4.0/24 into two sub networks having host size of 50. Find subnetwork address, subnet mask and IP address range for the sub network. [8]
- b) Explain Router architecture with suitable diagram. [8]

- Q11)a)** Discuss security issues at network layer with suitable example and possible solutions? [9]
- b) What are the functions of network Layer? Explain? [9]

OR

- Q12)a)** Explain Bandwidth Management? [9]
- b) Explain which points are considered while planning and implementing network? [9]



Total No. of Questions : 12]

SEAT No. :

P1804

[4859]-207

[Total No. of Pages : 2

B.E. (Computer Engineering)
c-ARTIFICIAL INTELLIGENCE
(2008 Course) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Use of logarithmic table, slide rules, Mollier charts, electronic pocket calculator and stream table is allowed.*
- 5) *Assume suitable data wherever necessary.*

SECTION-I

Q1) a) What are intelligent agents? Explain the architecture of a typical agent. **[8]**

b) Define the term Artificial Intelligence. Explain two applications of AI. **[8]**

OR

Q2) a) Explain in detail what is meant by task environment. Illustrate with example. **[8]**

b) What is the role of table driven agent program in simple reflex agent? Explain the functions of model based reflex agents. **[8]**

Q3) a) Explain A* Algorithm with suitable example. How is it possible to avoid loops in A*. **[10]**

b) What is Means ends analysis. Explain with example. **[8]**

OR

Q4) a) What is hill climbing? Explain Plateau, ridge, local maxima and global maxima. **[10]**

b) How to evaluate the performance of an algorithm? How does uniform cost search use algorithm's performance. **[8]**

Q5) a) Explain alpha beta cut off with an example. Assume a sample game tree for explanation. **[8]**

b) Explain Constraint satisfaction problem with example. **[8]**

OR

P.T.O.

- Q6)** Write short notes on: [16]
- a) Backtracking for CSP.
 - b) Evaluation functions for games.
 - c) Local search for CSP.
 - d) Partially observable games.

SECTION-II

- Q7)** a) Explain goal stack planning with an example of blocks world. [8]
b) Explain how planning problem is expressed in STRIPS. [10]

OR

- Q8)** a) Comment on Non linear planning and hierarchical planning. [8]
b) State the rules for converting the well formed formula to clause form with example. [10]

- Q9)** a) Describe any two learning methods. [8]
b) Explain fuzzy set and crisp set. Mention applications of fuzzy logic. [8]

OR

- Q10)** a) What are the basic axioms of probability? Why are they reasonable. [8]
b) Define the Bayes rule and explain its use with example. [8]

- Q11)** a) Give detailed architecture of expert system and explain its components. [8]
b) Explain the various phases of NLP with an example. [8]

OR

- Q12)** a) What is the difference between expert systems and traditional system? Comment on advantages and disadvantages of expert systems. [8]
b) Write short notes on Parsing. [8]



Total No. of Questions : 12]

SEAT No. :

P1805

[4859]-208

[Total No. of Pages : 3

**B.E. (Computer Engineering)
SOFTWARE ARCHITECTURE**

(2008 Course) (Semester-I) (Elective-I(d)) (410444)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *From section-I Answer (Q. 1 or Q. 2) and (Q. 3 or Q. 4) and (Q. 5 or Q. 6).*
- 3) *From section-II Answer (Q. 7 or Q. 8) and (Q. 9 or Q. 10) and (Q. 11 or Q. 12).*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Consider Civil Engineering / Architects profession of designing and constructing residential/office buildings. What is the difference between the role of architect and civil engineer? Similarly a software architect also helps build software with quality like security, performance etc. What is the difference between roles played by programmer and an architect. Explain with examples how software architect and architecture contributes to any software System's quality. **[9]**
- b) What is a deployment diagram? What kind of architectural decisions/ scenarios does a deployment diagram depict? Show the following two tier web application scenario using a deployment diagram. Scenario: Browser based client using HTTP to access static web pages. **[9]**

OR

- Q2) Write short notes on Any Three:** **[18]**
- a) Software design.
 - b) Synchronous and asynchronous messaging.
 - c) Software architect and his/her role in IT industry.
 - d) Software architecture and functional/nonfunctional requirements.
 - e) Software architecture and 4+1 views.

P.T.O.

- Q3)** a) Consider a hypothetical PAYROLL (employee salary) system. State the likely functional requirements for the system. Assuming a role of a software architect, discuss importance of accuracy, performance, data Confidentiality for your system. [8]
- b) What is importance of availability of a system? How availability of a system is achieved through various availability tactics. [8]

OR

- Q4)** Explain and illustrate the following concepts (in context of quality attribute/tactics) with examples, in brief: [16]
- a) Authorization versus authentication.
- b) UNDO command in Microsoft word.
- c) Dynamic, interactive websites.
- d) Testability, userfriendliness.

- Q5)** a) Define Design pattern. What are the types of design patterns? Explain in brief. [8]
- b) Give structure of Façade. Explain with real life example. [8]

OR

- Q6)** IN CONTEXT OF OBSERVER PATTERN answer the following: [16]
- a) How does action listener (event listener) in java work.
- b) What is publish subscribe.
- c) What are roles of subject and observer?
- d) Give a non-software example of observer pattern.

SECTION-II

- Q7)** a) What is XSLT, XML DOM parsers? [6]
- b) Compare and contrast J2SE and J2EE. [6]
- c) What is JDBC-ODBC driver, prepared statement in JDBC. [6]

OR

- Q8)** a) Explain role of middleware in 3-tier architecture. [6]
b) Write note on application server. [6]
c) What is socket? Enlist and explain different classes used in Java for socket programming. [6]

Q9) Briefly describe need, role, use of following technologies. [16]

- a) AJAX.
b) DOM tree.
c) Rich Internet applications.
d) DHTML.

OR

Q10)a) Explain various technologies available to develop client side. [8]

b) Explain n-tier web architecture. [8]

Q11)a) With neat diagram explain MVC. Also explain how it is supported by Java. [8]

b) What is Service Oriented Architecture? [8]

OR

Q12)a) What is XML, SOAP? [8]

b) What is STRUTS and what are its advantages? [4]

c) Explain servlet life cycle. [4]



Total No. of Questions : 12]

SEAT No. :

P1806

[4859]-209

[Total No. of Pages : 3

**B.E. (Computer Engineering)
a-MULTIMEDIA SYSTEMS
(2008 Course) (Semester-I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Draw diagram and explain structural components of Multimedia Database. **[8]**
- b) What is Multimedia Authoring? State any explain any three multimedia authoring tools. **[8]**

OR

- Q2)** a) Explain following terms with reference to multimedia: **[8]**
- i) Windows API.
 - ii) Graphics Libraries.
 - iii) DirectX
 - iv) Open GL.
- b) State and explain Multimedia Building Blocks. **[8]**

- Q3)** a) State and explain any four techniques to enhance the image in image processing. **[8]**
- b) Explain RLE and Huffman coding technique stating suitable example. **[10]**

OR

P.T.O.

- Q4)** a) Explain TIFF file format in brief. [8]
b) What is Histogram of an Image? Explain Histogram Equalization with suitable example. [10]

- Q5)** a) Explain terms PCM, DPCM & DM. [6]
b) Explain types of microphones based on constructional features and functional features. [10]

OR

- Q6)** a) Explain any two methods of audio compression. [8]
b) Explain with diagram Components of elementary audio system. [8]

SECTION-II

- Q7)** State the algorithm of LZW text compression and decompression. Compress the following string using LZW text compression. Also decompress the output generated after compression. Show tables.

aababacbaacbaadaaa [16]

OR

- Q8)** a) Explain in brief any two Text file formats. [8]
b) Describe steps involved in MPEG video compression technique. [8]

- Q9)** a) Explain Client Pull and Server Push animation. [8]
b) State and explain ten types of primitives of OpenGL. [10]

OR

- Q10)**a) Explain major steps involved in 3D animation. [10]
b) State and explain methods of computer based animation. [8]

- Q11)** a) State and explain any four applications of multimedia over internet. [8]
b) Explain various networking components required for a reliable Multimedia data transmission. [8]

OR

Q12) Write short notes on following: [16]

- a) Video conferencing.
- b) Tele - robotics system.
- c) Multimedia Editors.



Total No. of Questions : 12]

SEAT No. :

P1690

[4859]-21

[Total No. of Pages :3

B.E. (Civil)

INTEGRATED WATER RESOURCES & PLANNING

(2008 Pattern) (Elective-IV) (Semester-II)(401008)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labeled diagrams wherever necessary.*

SECTION-I

- Q1)** a) Write a short note on scope for privatization in the field of water resources. **[4]**
- b) What is national water policy? Explain the recent norms of National water policy at state level. **[6]**
- c) Enlist the different water infrastructure problems and their perspective. **[8]**

OR

- Q2)** a) What are riparian rights? Explain any two **[6]**
- b) Explain the significance of prior appropriation. **[4]**
- c) Discuss the different principals of planning and financing of water resource project. **[8]**

- Q3)** a) The runoff of stream in the month of October has mean and standard deviation of 165 and 200 cumec - months respectively. Assuming that lognormal distribution is a good fit. Find the probability that October runoff in the stream in any year exceeds 185 cumec months. What is the probability that the October runoff would fall in the range 100 to 250 cumec months? **[8]**
- b) Define mean, mode, median, standard deviation and coefficient of a distribution. **[8]**

OR

P.T.O.

- Q4)** a) Write short note on [8]
- i) Application of ANN in flood prediction/rainfall-runoff prediction.
 - ii) Use of Fuzzy Logic in water resources planning & management.
- b) Define mean, mode, median, standard deviation and coefficient of a distribution. [8]

- Q5)** a) State general methods of flood forecasting used in India. [8]
- b) Distinguish between the mitigation plans of flood management and drought management. [8]

OR

- Q6)** a) Explain the use of geoinformatics in drought management. [8]
- b) What are different types of Drought? Explain severity index of drought with suitable examples in India. [8]

SECTION-II

- Q7)** a) State the different water requirements for environmental management and explain any three of them in detail. [9]
- b) What is water quality management? Discuss various issues related to water quality management. [9]

OR

- Q8)** a) What is the role of an Civil Engineer in protection of vital ecosystem.[9]
- b) Write a short note on Aquaculture. [9]

- Q9)** a) Correlate direct and indirect benefits of water resource development to employment generation. [8]
- b) Explain 'Co- operative movement in the water resource development' with the help of case study. [8]

OR

- Q10)a)** Write a note on control of water logging and its different types. [8]
b) Explain how the social impact of water resource development is related to agro-industry. [8]

- Q11)a)** What is Decision Support system for Integrated Water Resource Planning and Management? Explain with suitable example. [10]
b) Explain the concept of perspective plan for basin development and management. [6]

OR

- Q12)a)** Write short note on [8]
i) Application of ANN in flood prediction/rainfall-runoff prediction.
ii) Use of Fuzzy Logic in water resources planning and management.
b) State and define four statistical parameters used in statistical methods.[8]



Total No. of Questions : 12]

SEAT No. :

P1807

[4859]-210

[Total No. of Pages : 3

B.E. (Computer Engineering)
b-MOBILE COMPUTING
(2008 Course) (Semester-I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Enlist and explain the Teleservices, bearer services and supplementary services provided by GSM. **[10]**
- b) State reasons behind the design of GSM system. **[6]**

OR

- Q2)** a) Explain channel layout and frequency bands of operation in GSM system. What are the different categories of mobile telephone units specified for the European GSM system? **[8]**
- b) Discuss in detail, the typical GSM architecture. **[8]**

- Q3)** a) Explain the structure of a TDMA slot with a frame for following bursts **[8]**
- i) Frequency Correction burst.
 - ii) Synchronization burst.
- b) Explain frame, multiframe, superframe and hyperframe with the suitable diagram. **[8]**

OR

P.T.O.

Q4) a) In a speech frame there are 24 frames in one multiframe lasting 120 ms carrying data. The number of data bits per frame is 114. What is the data rate for full and half rate channels? [8]

b) Explain different service areas in which the GSM is partitioned into. [8]

Q5) a) What do you mean by mobility management? Explain three different states of mobile to be considered in the mobility. [8]

b) With the help of a diagram, explain the GSM signaling protocols. [10]

OR

Q6) a) Explain in detail connection request procedure in formation of a call. [8]

b) What are the steps in the establishment of MS-PSTN call? Explain the call set-up with suitable signal and response diagram. [10]

SECTION-II

Q7) a) What are the four basic security services provided by GSM? Explain any two of them. [8]

b) Explain generic authentication process in the context of Security management in GSM systems. Why do you think the ciphering key K_c must differ from one call to another? [8]

OR

Q8) a) What are the challenges faced in developing secure applications for mobiles? Explain how these challenges are worked with. [8]

b) Briefly describe two different types of SIM implementation in GSM. Provide the respective advantages and disadvantages of these two implementations. List important items stored in a SIM. [8]

Q9) a) What are the multiplexing issues in frequency and time domains? [8]

b) Derive the multiple access efficiency of FDMA system. [8]

OR

- Q10)**a) Explain the functioning of CDMA system. [8]
b) Derive the multiple access efficiency of TDMA system. [8]

- Q11)**a) Explain the procedures provided by RR layer during “Connected Phase”. [8]
b) Explain three main protocols of RR layer. [10]

OR

- Q12)**a) With the help of neat diagram, explain different formats of LAPD_m protocol. [8]
b) Explain the four procedures in mobility management and the respective MAP protocols. [10]



Total No. of Questions : 12]

SEAT No. :

P1808

[4859]-211

[Total No. of Pages : 3

**B.E. (Computer Engineering)
c-EMBEDDED SYSTEMS
(2008 Course) (Semester-I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *In Section-I, attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.*
- 2) *In Section-II, attempt Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12.*
- 3) *Answers to the two sections must be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Which characteristics of an Embedded system make it different than a General Purpose system? [6]
- b) Explain how Digital Signal processor and Media processor are different than a general purpose processor. [6]
- c) Explain different steps in Embedded system design process. [6]

OR

- Q2)** a) Draw a layered architecture of Embedded system. Discuss various components in the Embedded System. [6]
- b) Discuss recent trends in Embedded Systems. [6]
- c) What challenges are faced while designing an embedded system. [6]

- Q3)** a) Discuss different structural units in a processor in an embedded system. Mention few advanced units. [8]
- b) Discuss various actions taken to reduce the power consumption in an embedded system. [8]

OR

P.T.O.

- Q4) a)** A robotic control system is to be designed. For this application, select the appropriate processor based on: [8]
- i) Instruction cycle time.
 - ii) Bus width.
 - iii) MIPS.
 - iv) On chip cache.
 - v) On chip RAM/ROM.
- b) Draw the architecture of ARM7 core. How ARM9 family is different than ARM7? [8]

- Q5) a)** Discuss the topology used by devices to communicate through USB protocol. Mention different types of data transfer. [8]
- b) Compare RS232 and RS485 standards. [5]
- c) What is the need of data converters in embedded systems? [3]

OR

- Q6) a)** Which optical devices are commonly used in embedded system? Explain with suitable examples. [8]
- b) Discuss different fields in the data frame of CAN bus protocol. What are the applications of CAN? [8]

SECTION-II

- Q7) a)** With the help of neat diagram, explain software development cycle for embedded system. [8]
- b) Explain usage of stacks and queues in embedded system programming. [10]

OR

Q8) a) What is the use of an emulator in embedded system design? Explain with the help of diagram. [10]

b) What are the advantages and disadvantages of programming in C++ for Embedded system? [8]

Q9) a) Explain the kernel services in an OS. [8]

b) What are the OS units at an RTOS kernel? [8]

OR

Q10) a) Discuss different ways in which interrupts are handled in RTOS environment. [6]

b) Compare assembly language programming and high level language programming. [4]

c) Discuss various handheld operating systems. [6]

Q11) a) Differentiate between soft real time operating system and hard real time operating system. [4]

b) Discuss different applications where VxWorks is used. Also list its features. [6]

c) Give details of hardware and software components of mobile phone. [6]

OR

Q12) a) Enlist the software and hardware requirements of digital camera. [8]

b) Differentiate between soft real time operating system and hard real time operating system. [4]

c) Write a short note (Any One): [4]

i) μ COS-II

ii) Special OS features for automotive systems.



Total No. of Questions : 12]

SEAT No. :

P1809

[4859]-212

[Total No. of Pages : 2

B.E. (Computer Engineering)
d-SOFTWARE TESTING AND QUALITY ASSURANCE
(2008 Course) (Semester-I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from Section-I and three questions from Section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) a) State the importance of software testing. Explain the role of software testing in software quality assurance with criteria for completion of testing. **[8]**

b) Explain the test plan with an example. **[8]**

OR

Q2) a) Explain the testing life cycle activities. **[8]**

b) Explain the testing strategies used in software testing. **[8]**

Q3) a) Explain any two white box testing methods with test case design. **[10]**

b) How do the test cases are derived in graph based testing? **[8]**

OR

Q4) a) Explain any two black box testing methods. **[10]**

b) Explain the need of domain testing with the design of test cases. **[8]**

Q5) a) Explain the equivalence partitioning testing method with an example. **[8]**

b) Describe the data flow testing with example. **[8]**

OR

P.T.O.

- Q6)** a) Explain the testing of a student attendance monitoring system with test cases. [8]
b) Compare white box and black box testing methods. Give the challenges of white box testing. [8]

SECTION-II

- Q7)** a) What are testing metrics? Explain the purpose of testing metrics in measurement of software quality. [8]
b) Explain the regression and smoke testing. [10]

OR

- Q8)** a) Describe random testing and validation testing. [10]
b) Explain the quality attributes of a software product. [8]

- Q9)** a) Explain the measurement tools and techniques used in testing. [8]
b) Explain ISO quality factors. [8]

OR

- Q10)** Explain the following in brief: [16]
a) Goal Question Metric.
b) Quality Control.
c) Verification.
d) Cost of quality.

- Q11)** a) What is the need and importance of automated testing? Explain with an example. [8]
b) Explain the testing of a web based application with an example. [8]

OR

- Q12)** a) Explain the GUI testing. [8]
b) Explain an automated testing tool with its features. [8]



Total No. of Questions : 12]

SEAT No. :

P1810

[4859]-213

[Total No. of Pages : 3

B.E. (Computer Engineering)
DISTRIBUTED OPERATING SYSTEMS
(2008 Course) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Discuss the differences between workstation server and processor pool models. [7]
- b) What is the role of stub in RPC execution? How do stubs make RPC execution transparent? [7]
- c) Explain the techniques used to overcome scalability related issues. [4]

OR

- Q2)** a) Discuss the relative advantages and disadvantages of Synchronous and Asynchronous Communication in distributed system. Explain its use in inter-process communication mechanisms. [7]
- b) Explain parameter passing issues in RPC mechanism with suitable examples. [7]
- c) Explain process addressing in distributed system. [4]
- Q3)** a) Explain in detail Lamport's Logical clock and conditions satisfied by logical clocks. [8]
- b) Explain why transient synchronous communication has inherent scalability problems, and how these could be solved? [8]

OR

P.T.O.

- Q4)** a) Discuss centralised approach for mutual exclusion. What are the necessary and sufficient conditions that mutual exclusion algorithms should satisfy? [8]
- b) What is the need of clock synchronization in distributed systems? Explain different clock synchronization algorithms. [8]
- Q5)** a) Show in Ricart Agrawala's algorithm for Mutual Exclusion, that "the critical section is accessed according to increasing order of time stamps". [8]
- b) Explain hierarchical deadlock detection algorithm with suitable example. [8]

OR

- Q6)** a) What are the basic differences between token based and non-token based algorithm for mutual exclusion? [8]
- b) What is Byzantine agreement problem? Explain the solutions to the Byzantine agreement problem. [8]

SECTION-II

- Q7)** a) List and explain important goals of distributed file system. Explain file access models in distributed file systems. [10]
- b) Explain the algorithms for implementing DSM. [8]

OR

- Q8)** a) Explain the components of Load Sharing algorithms, and discuss load sharing policies. [10]
- b) Explain task migration in distributed system with suitable example. [8]
- Q9)** a) Explain the differences between the forward and backward error recovery. [8]
- b) Explain process failure, system failure, secondary storage failure and communication medium failure in a computer system. [8]

OR
2

Q10)a) Explain in details, access control model for security in distributed operating system. [8]

b) Explain voting protocol in designing a fault tolerance system in distributed environment. [8]

Q11)a) What is web service? State the key specifications of a web service. [8]

b) Explain Service Oriented grid with suitable diagram. [8]

OR

Q12)a) Explain the grid components and their services. Discuss the major categories of resource grids. [8]

b) What is service oriented architecture? Compare service oriented architecture with component based architecture. [8]



Total No. of Questions :10]

SEAT No. :

P1811

[4859]-214

[Total No. of Pages :3

B.E. (Computer)

**ADVANCED COMPUTER ARCHITECTURE AND COMPUTING
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain following classification approaches for multiprocessor: **[12]**

- i) Degree of coupling
- ii) Memory access
- iii) Flynn's classification
- iv) Feng's classification

b) List and explain the basic issues in parallel processing. **[6]**

Q2) a) Consider a dynamic pipelining with five segments S_1, S_2, S_3, S_4 and S_5 characterized by following reservation table **[12]**

	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8
S_1	X								X
S_2		X	X					X	
S_3				X					
S_4					X	X			
S_5							X	X	

P.T.O.

- i) Determine latencies in the forbidden list (F) and the collision vector(C)
 - ii) Draw the state diagram for uniform pipeline
 - iii) Calculate sample cycles and greedy cycles
 - iv) Determine Minimum Average Latency (MAL)
- b) How loop-unrolling technique improves performance of pipelining?[4]

Q3) a) What are characteristics of vector processors? Explain implementation of following loop in conventional scalar processor and vector processor. [8]

```

DO 100    I = 1, N
          A(I) = B(I) + C(I)
100      B(I) = 2* A(I+1)

```

- b) Explain following pipelined vector processing methods with respect to vector summation computation. [8]
- i) Vertical Processing
 - ii) Vector Looping

How intermediate results are handled in both the cases?

Q4) a) Draw and explain two different configurations of array processors. What the network design decisions are for inter PE communication? [8]

b) Consider a linear array of P processors. N keys have to be sorted parallel. Initially N keys are equally divided among all processors. Assuming SIMD architecture, write a parallel algorithm to sort N keys. [8]

Q5) Write short notes on any two: [16]

- a) Systolic array architecture
- b) Bus arbitration techniques in multiprocessing systems
- c) VLIW processor

SECTION - II

- Q6)** a) List and explain various design issues involved in designing multiprocessor system. [9]
- b) Explain following types of network used to implement processor-memory interconnection with respect to shared memory multiprocessor system. [9]
- i) Multiport Memory
 - ii) Multistage Network
- Q7)** a) Explain following issues in multiprocessor systems [8]
- i) Inter process communication
 - ii) Synchronization software mechanism
- b) What are the different alternatives for interconnecting processors and memory with respect to shared memory multiprocessor systems? [8]
- Q8)** a) What is basic concept of Multithreading? Explain multithreaded architectures and it's computational model for parallel processing systems. [8]
- b) Discuss salient features of parallel processing languages. [8]
- Q9)** a) What are the features of Scalable Processor Architecture? Explain register windows and its parameter passing between procedures of SPARC architecture. [8]
- b) Discuss Cache Coherence Problem and its solutions. [8]
- Q10)** Write short note on any two: [16]
- a) Neuro Computing
 - b) Latency hiding techniques
 - c) Optical computing

EEE

Total No. of Questions : 12]

SEAT No. :

P1812

[4859]-215

[Total No. of Pages :3

B.E. (Computer Engineering)

a-PATTERN RECOGNITION

(2008 Course) (Elective-III) (Semester-II) (410450)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any 3 questions from each Section .*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Define pattern recognition ? State and explain different approaches for pattern recognition. **[8]**

b) State and explain different available supervised pattern recognition methods and explain any one. **[8]**

OR

Q2) a) Explain with example following terms: **[8]**

i) Feature ii) Pattern iii) Classification iv) Feature Vector.

b) Explain in brief various state of the art pattern recognition applications?**[8]**

Q3) a) Explain Bayesian classifier and bays criterion function for defining risk for decision making. **[8]**

b) Three machines A, B, C produce respectively 60%, 30%, and 10% of the total number of items of a factory. The percentages of respective defective outputs of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found to be defective. Find the probability that the item was produced by machine C? **[8]**

OR

P.T.O.

- Q4)** a) Explain Bayes minimum error rate classifier with example. [8]
b) What is linear discriminant function and decision hyper plane? Explain in brief. [8]

- Q5)** a) What is parametric estimation? Explain any one parametric estimation method. [8]
b) What are sample covariance, and absolutely unbiased estimator? Explain in detail. [10]

OR

- Q6)** a) Discuss maximum Likelihood approach used for parameter estimation. [8]
b) Explain Gaussian mixture model for density estimation with the advantages of Gaussian mixture model over other estimation? [10]

SECTION-II

- Q7)** a) How Hidden Markov model is useful to solve well known coin-tossing (two coins) problem? [8]
b) What is Overfitting problem? Explain in detail with suitable example. [8]

OR

- Q8)** a) What is mean by Context-dependent classification? Explain Discrete Hidden Markov Model and continuous density hidden Markov model. [8]
b) Define and explain within-class scatter matrix & between-class scatter matrix. [8]
- Q9)** a) Explain what is the difference between parametric and non parametric density estimation. [8]
b) Explain the steps involved nearest neighbour approach for multi category classification. [8]

OR

- Q10)a)** Explain batch perceptron algorithm for finding a solution vector in brief.[8]
- b) Explain non parametric technique for directly estimating the posteriori probabilities in brief. .[8]

- Q11)a)** What do you mean by a decision tree? Explain its importance in pattern classification. [10]
- b) Justify the significance of Nominal data in a classification problem with suitable example. .[8]

OR

- Q12)a)** Explain the process of clustering. State and explain various techniques used for clustering. [10]
- b) What are the basic steps that an expert must follow in order to develop a classification task? [8]



Total No. of Questions : 12]

SEAT No. :

P1813

[4859]-216

[Total No. of Pages :2

B.E. (Computer Engg.)
HIGH PERFORMANCE NETWORKS
(2008 Course) (Elective-III) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) Discuss in short about 1000 BASE-X family with suitable applications.[8]

b) Explain high level system architecture of Gigabit. [10]

OR

Q2) a) Explain in short the need of flow control in gigabit Ethernet? How it is supported? [8]

b) Differentiate between 10, 100, 1000 Mbps n/w based on their MAC characteristics. [10]

Q3) a) Explain physical configurations for ISDN User-Network Interfaces with examples. [8]

b) Explain in brief elementary functions for ISDN. [8]

OR

Q4) a) Describe the SS7 protocol architecture. [8]

b) Explain Frame-Mode Control Signaling with example. [8]

P.T.O.

- Q5)** a) Explain in short the functional architecture of B-ISDN. [8]
b) What is Quality of Service? Explain in detail the various ATM QoS parameters specifying their category of assessment. [8]

OR

- Q6)** a) Explain in details the ATM Reference model. [8]
b) What are the different ATM Service Categories? Explain in details. [8]

SECTION-II

- Q7)** a) Draw and explain a typical ADSL equipment configuration. [8]
b) Draw and explain the general block diagram of DMT Transmitter. [8]

OR

- Q8)** a) Explain architecture of VDSL. [8]
b) Explain in short why are some variations of xDSL asymmetric? [8]

- Q9)** a) Explain step-by-step MPLS operations that can occur on data packets in an MPLS domain. [8]
b) Explain working of RSVP. [8]

OR

- Q10)**a) Describe the following terms related to MPLS operation. [8]
i) LER ii) LSR iii) LDP iv) LSP
b) Explain tunneling in MPLS. [8]

- Q11)**a) What is Wi-Fi? Explain with configuration steps. [10]
b) What is WiMax? Explain in details. [8]

OR

- Q12)**a) Comment on any 3 WiMax QoS classes along with suitable application support. [8]
b) Explain the following terms related to WiMax . [10]
i) Fixed wireless access.
ii) Nomadic wireless access.



Total No. of Questions : 12]

SEAT No. :

P1814

[4859]-217

[Total No. of Pages :3

B.E. (Computer)

c-NEURAL NETWORKS

(2008 Course) (Elective-III) (410450) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Draw a McCulloch Pitts Neuron model. Define the firing rule and explain how it performs the basic logic operations for NOR Gate. **[8]**
- b) What do you mean by Neural Net learning? Discuss Winner-Take-All learning rule in detail. **[8]**

OR

- Q2) a)** What is weight vector in ANN training? How it is described in following learning laws: i) Hebb's Law and ii) Delta Learning Law. **[8]**
- b) Compare the features and performance of computer to that of a biological neural network w.r.t different parameters. **[8]**
- Q3) a)** What is linearly Non-separable classification problem? Can single perceptron solve such problem? Discuss ADALINE computing model of a neuron. **[10]**
- b) Draw and explain the architecture of RBFN (Radial Basis Function Network). How it act as classifier? **[8]**

OR

P.T.O.

Q4) a) Draw a 3-layer FeedForward Neural Network. Explain the back propagation training algorithm in detail. [10]

b) What is an Activation function? How it helps in Neural Network training? Explain any two activation functions. [8]

Q5) a) Explain the architecture of Boltzmann machine. [8]

b) What do you mean by associative learning? Discuss the architecture and operation of Hopfield Network. [8]

OR

Q6) a) What is meant by capacity of a feedback network? What is the significance of hidden units? [8]

b) With example illustrate the concept of stochastic update and thermal equilibrium. [8]

SECTION-II

Q7) a) How pattern Clustering is different than Classification? Explain with algorithm the self-organizing network used for feature mapping. [10]

b) Explain how Support Vector Machine (SVM) can be used for pattern classification. [8]

OR

Q8) a) What is plasticity- stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]

b) Discuss Hybrid Learning procedure applied to RBFN. [8]

Q9) a) What is vector quantization? With example discuss how it can be used for pattern clustering? [8]

b) Explain with architecture and algorithms the use of ANN in hand written digit recognition. [8]

OR

Q10)a) How can we solve the optimization problem by ANN? Discuss the practical difficulty in solving the travelling salesman problem by means of ANN. **[8]**

b) Discuss in brief auto-association and hetero-association process used for neural processing. **[8]**

Q11)a) What is Soft Computing ? What are the application areas of Soft Computing? Compare the Neural Networks and Fuzzy Logic as important tools of Soft computing. **[8]**

b) How Fuzzy sets are different than traditional set? How Fuzzy logic can be used with Neural Networks for supervised or unsupervised learning? **[8]**

OR

Q12)a) What do you mean by Fuzzy Logic? What is the use of membership function? Give any two examples. **[8]**

b) Explain the architecture of any suitable Neuro Fuzzy system designed for pattern recognition task. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1815

[4859]-218

[Total No. of Pages :4

**B.E. (Computer Engineering)
d-ADVANCED DATABASES
(2008 Course) (Elective-III) (Semester-II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What are the different partitioning technique? Give an example of query for which that partitioning technique would provide the fastest response. [8]
- b) What factors could result in skew when a relation is partitioned on one of its attribute by. [8]
- i) Hash partitioning.
 - ii) Range partitioning
- In each case, what can be done to reduce the skew.

OR

- Q2)** a) What is parallelism? Explain the interquery & Intraquery parallelism. [8]
- b) Explain partitioned parallel hash join. [8]
- Q3)** a) What are the different approaches for high availability in the distributed system. [8]
- b) Explain the methods of data storage in distributed system. [8]

OR

P.T.O.

Q4) a) Discuss different kinds of failure in the distributed system and how to handle it? [8]

b) What are transparency in the distributed system? Discuss the relative advantages of centralized & distributed databases. [8]

Q5) a) Why do we have the XML DTD? What is well- formed documents? Explain with an example. [10]

b) Why do we need to maintain state at the middle tier? What are cookies and how does a browser handle the cookies? [8]

OR

Q6) Write short note on the following. [18]

a) XQUERY.

b) XPATH

c) Thin & Thick Client

d) 3 tier architecture.

SECTION-II

Q7) a) Explain multidimensional data models in details. [8]

b) Explain the following [8]

i) OLAP

ii) Data Cube.

OR

Q8) a) Explain CUBE and ROLL-UP extended aggregation with suitable example. [8]

b) Explain the architecture of data warehouse and also explain different indexing technique used in data warehouse. [8]

- Q9)** a) What are different data cleaning methods? Explain binning & outlier analysis. [6]
- b) State and explain K-MEANS algorithm for clustering. [6]
- c) Consider the following data set. [6]

Food Item	Protein Content	Fat Content
F1	1.1	60
F2	8.2	20
F3	4.2	35
F4	1.5	21
F5	7.6	15
F6	2.0	55
F7	3.9	39

Find the cluster for the object in the dataset by using K-means algorithm, if $k=4$

OR

- Q10)**a) What is Best split? Explain ID3 algorithm to create decision tree. [6]
- b) Explain the following: [6]
- i) Text Mining.
 - ii) GINI Index.
 - iii) Information gain.
- c) Find the association rule for the given dataset which satisfy following requirements. [6]
- i) Support =30%

ii) Confidence=90%

Customer		Products		
C1	S1		S3	
C2		S2		
C3				S4
C4		S2	S3	S4
C5		S2	S3	
C6		S2	S3	
C7	S1	S2	S3	S4
C8	S1		S3	
C9	S1	S2	S3	
C10	S1	S2	S3	

Q11)a) What you mean by relevance ranking? Explain different methods of relevance ranking for the boolean & ranked query. [8]

b) Explain the following: [8]

- i) Inverted Index
- ii) Ontologies
- iii) Stop words

OR

Q12)a) What is page ranking and popularity ranking? Explain in brief. [6]

b) Explain the following terms. [10]

- i) Web crawlers.
- ii) Homonyms.
- iii) Vector space model.
- iv) Zipfian distribution.



Total No. of Questions : 12]

SEAT No. :

P3180

[Total No. of Pages :2

[4859]-219

B.E. (Computer) (Semester- II)
VLSI AND DIGITAL SYSTEM DESIGN
(2008 Pattern) (Elective-IV)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Explain design methodology with flow chart for ASIC design. [8]
b) Explain the role of technology scaling in growth of IC Design. [9]

OR

- Q2)** a) Explain the need of layout design rules. Explain design rules for interconnects. [9]
b) Explain the classification of IC technology based on circuit technology. [8]

- Q3)** a) Explain Shallow Trench Isolation (STI) with process flow. [8]
b) Explain limitations of further scaling of CMOS device. [9]

OR

- Q4)** a) Explain geometry parameters of interconnects. Explain merits and demerits of Cu interconnects over Al interconnect. [8]
b) Explain the device isolation in details. [9]

- Q5)** a) Explain basic properties of Silicon Wafer. [4]
b) Explain steps in active region formation. [4]
c) Explain Chemical vapor oxidation technique. [8]

OR

- Q6)** a) Write a short note on [8]
i) Czochralski and Float-Zone Crystal Growth Methods
ii) Mask engineering

P.T.O.

- b) Explain photolithography process in detail. [8]

SECTION-II

- Q7)** a) Explain merits and demerits of FPGA over ASIC. [8]
b) Compare data flow, behavioral and structural modeling styles. [9]

OR

- Q8)** a) Explain the following terms with examples. [9]
i) Concurrent statements
ii) Variable
iii) Entity
b) Write VHDL Code for [8]
i) 8:1 Multiplexer.
ii) D-Flip flop

- Q9)** a) Explain the PAL and PLA in details. [8]
b) Explain static and dynamic circuit design styles. [8]

OR

- Q10)**a) Explain static and dynamic behavior of CMOS devices and Circuits.[8]
b) Explain different digital design levels. [8]

- Q11)**a) Explain the metastability in details. [5]
b) Explain software aspects of digital design. [8]
c) Discuss logic levels and noise margins with respect to CMOS circuits.[4]

OR

- Q12)**a) Draw a neat diagram and explain briefly 6-T SRAM. [8]
b) For Combinational Logic design explains the following design metrics.[9]
i) Power Consumption
ii) Propagation Delay
iii) Noise margin



Total No. of Questions : 12]

SEAT No. :

P3547

[4859]-22

[Total No. of Pages : 2

B.E. (Civil)

**ADVANCED TRANSPORTATION ENGINEERING
(2008 Pattern) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Discuss the various types of surveys which are required to be carried out in order to design the traffic and transportation system in the vicinity of an international airport, including the air traffic and terminal designs. **[18]**

OR

Q2) Discuss the various types of surveys which are required to be carried out in order to design the traffic and transportation system for the smart cities and integrating them with the existing developed urban areas. **[18]**

Q3) Discuss with examples, advantages and limitations of the BRT systems. Suggest measures to overcome these limitations. **[16]**

OR

Q4) Discuss with examples, advantages and limitations of the METRO systems. Suggest measures to overcome these limitations. **[16]**

Q5) Discuss the various models used by the public sectors in involving Privatization (PPP) so as to develop and maintain the physical infrastructure. What Pre-requisites are necessary for the success of PPP models? Elaborate. **[16]**

P.T.O.

OR

Q6) Discuss the various financing options and the tools available for evaluating these options so that the economic analysis of the infrastructure development alternatives can be done. Highlight strengths, weaknesses of each option. **[16]**

SECTION - II

Q7) Discuss the input parameters for designing a signalling system on a national highway and detail out the instrumentation aspects for its proper functioning. Highlight role of ITS in this design and monitoring. **[18]**

OR

Q8) Discuss the various methods used by the modern planners for the accurate counting and future forecasts of the road traffic in order to enable them to design an integrated comprehensive transportation network, for the study area. **[18]**

Q9) Explain in detail the Benkelmen Beam method used for ascertaining the flexible pavement characteristics, as per the codal provisions. Discuss advantages and limitations of this method. **[16]**

OR

Q10) Explain the complete design procedure as per IRC-37, used for flexible pavements for subgrade as well as the topping layers. **[16]**

Q11) Compare and contrast between the rigid pavements and the flexible pavements. Explain concepts of **[16]**

- a) flexible rigid pavement and
- b) rigid flexible pavements.

OR

Q12) Explain the complete design procedure as per IRC-81, used for designing an overlay. Discuss the functions of any overlay. **[12 + 4 = 16]**

RRRR

Total No. of Questions : 12]

SEAT No. :

P1816

[4859]-220

[Total No. of Pages :4

B.E. (Computer)

b-OPERATIONS RESEARCH

(2008 Course) (Elective-IV) (410452) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain briefly the major phases of operations research. **[8]**

- b) A doctor recommends two foods F1 and F2 to a patient for his diet which includes at least 1000 units of vitamin, 850 units of protein and 700 unit of fat. Each unit of food F1 contains 15 units of vitamin, 18 units of protein, 12 units of fat. Each unit of food F2 contains 22 units of vitamin, 15 units of protein and 16 units of fat. cost of F1 and F2 is R.s 5/- and Rs 8/- respectively. Formulate the problem as LPP to obtain the minimized cost for a diet. **[10]**

OR

Q2) a) Solve the following LPP using the simplex method. **[10]**

$$\begin{aligned} \text{Max } Z &= 2x_1 - x_2 + x_3 \\ \text{Subject to } 3x_1 + x_2 + x_3 &\leq 60 \\ x_1 - x_2 + 2x_3 &\leq 10 \\ -x_1 - x_2 + x_3 &\geq -20 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

- b) What are limitations of Graphical method? **[8]**

P.T.O.

Q3) a) Box 1 contains 2000 Bulbs of which 5% are defective. Box2 contains 500 bulbs of which 40% are defective. Box 3 and Box 4 contains 1000 bulbs each with 10% defective. A Box is selected at random and a bulb is selected as random . **[8]**

i) What is probability that selected bulb is defective?

ii) If bulb is defective. What is probability that it is selected from box 2?

b) What is Normal Distribution? Explain central limit theorem and standard normal random variable. **[8]**

OR

Q4) a) What are the limitations of the game theory? **[8]**

b) A newspaper distributor distributes a particular newspaper in a local market. Purchase price of newspaper is 1.05 Rs and selling price 1.50 Rs/-. An unsold copy is disposed of in the recuse market at 0.05/- Rs. The estimates for number of copies in demand is given as follows.

Demand	15	16	17	18	19	20
Probability	0.04	0.19	0.33	0.26	0.11	0.07

How many copies of newspaper should the distributor order so that the expected profit is maximum? Find the maximum expected profit. **[8]**

Q5) a) List and explain performance measure of a queuing system. **[8]**

b) A car park contains 5 cars. The arrival of cars is poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with a mean of 5 hours. How many cars are in the car park on an average? **[8]**

OR

Q6) a) Describe Kendall notations of queuing models classification. **[8]**

b) A super market has two girls ringing up sales at counters. If the service time from each customer is exponential with a mean of 4 minutes and if possible arrive in a poisson fashion at the rate of 10 an hour, then find.**[8]**

i) What is the probability of having an arrival has to wait for service?

ii) What is the expected percentage of idle time for each girl?

SECTION-II

Q7) a) Explain following terminologies used in solving sequencing problems. [10]

- i) No. of machines.
- ii) Processing order.
- iii) Total Elapsed time
- iv) Idle time on a machine.
- v) No passing Rule.

b) Solve following sequencing problem to minimize the total elapsed time. [8]

Job →	I	II	III
Department ↓			
A	8	6	5
B	8	3	4

OR

Q8) a) Describe Johnson's Algorithm for processing 'N' jobs through two machines. [10]

b) A company has two machines M_1 and M_2 , on which six jobs are to be processed in the order M_1 and M_2 . The processing time (in hours) for each job on these machines is as follows. [8]

Jobs →	J_1	J_2	J_3	J_4	J_5	J_6
Machines ↓						
M_1	1	3	8	5	6	3
M_2	5	6	3	2	2	10

Find optimal job sequence, total elapsed time, idle time for each machine M_1 and M_2 .

Q9) a) Explain mathematical formulation of non linear programming. [8]

b) Solve following non linear programming problem [8]

$$\begin{aligned}
 Z_{\min} &= 4x_1 + 9x_2 - x_1^2 - x_2^2 \\
 \text{Subject to} \quad &4x_1 + 3x_2 = 15 \\
 &3x_1 + 5x_2 = 14 \\
 &x_1, x_2 \geq 0
 \end{aligned}$$

OR

Q10)a) Explain mathematical formulation of Geometric programming problem. [8]

b) Describe the process of piecewise linear approximation of non linear programming. [8]

Q11)a) List and explain various features of dynamic programming. [8]

b) Discuss specific models of dynamic programming. [8]

OR

Q12)a) List and explain applications of Dynamic programming. [8]

b) Write a short note on Equipment replacement problem. [8]



Total No. of Questions : 12]

SEAT No. :

P1817

[4859]-221

[Total No. of Pages :3

B.E. (Computer Engineering)

c-CLOUD COMPUTING

(Elective-IV) (2008 Course) (410451) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is demand self service? Describe in detail implementation in cloud computing platforms. **[8]**
- b) What is cloud computing? Enlist and explain three service models and four deployment models of cloud computing. **[8]**
- c) Explain in brief how cloud helps reducing capital expenditure. **[2]**

OR

- Q2)** a) Describe in detail Amazon dynamo infrastructure cloud from user's perspective. **[8]**
- b) Explain component stack of SaaS, PaaS, IaaS. **[8]**
- c) Explain network bottleneck challenge in cloud computing. **[2]**

- Q3)** a) What is multi-entity support? Describe in detail multi-tenancy using single schema and multiple schema approach. **[8]**
- b) Enlist and explain some of common pitfalls that come with virtualization. **[8]**

OR

P.T.O.

- Q4)** a) Explain in detail server consolidation using virtualization technology. [8]
b) How the virtualization enterprises an automating infrastructure management with level '0' to level '3'. [8]

- Q5)** a) Compare SOAP and REST paradigm in the context of application deployment on different cloud providers or between different applications & in -house deployment. [8]
b) Explain the architecture of cloud file system using GFS and HDFS. [8]

OR

- Q6)** a) What is parallel efficiency? Discuss with map-reduce model. [8]
i) Explain architecture of Google App engines Data store and its underlying technology. [8]

SECTION-II

- Q7)** a) Explain different cloud information security objectives. [6]
b) Why cloud computing brings new threats. [6]
c) Define trusted cloud computing and explain cloud service provider risks. [6]

OR

- Q8)** a) What are different testings involves in secure cloud software. [6]
b) Explain the two functional functions, identity management & access control. Which are required for secure cloud computing. [6]
c) Define "Disaster" what are alternative services are available in disaster recovery planning. [6]
- Q9)** a) Enlist & explain principal design issues that are to be addressed while designing a GOS-aware distributed (middleware) architecture for cloud.[8]
b) Enlist and explain different issues in inter-cloud environments. [8]

OR
2

Q10)a) What si GOS monitoring in a cloud computing? [8]

b) Explain different modules of quality of service GOS aware cloud architecture. [8]

Q11)a) Explain Eucalyptus cloud infrastructure with its components. [8]

b) Explain with features & functions of Apache virtual computing Lab. [8]

OR

Q12)a) Explain in detail (XcP) Xen Cloud Platform with suitable block diagram. [8]

b) What is open Nebula cloud? Explain main components of Open Nebula. [8]



Total No. of Questions : 12]

SEAT No. :

P3181

[Total No. of Pages :2

[4859]-222

B.E.(Computer Engineering)
INFORMATION SECURITY (IS)
(2008 Pattern) (Elective-IV)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section-I and three questions from section-II*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What are different attributes of information security? Explain each in detail. [10]

b) Explain lifecycle of information security with diagram. [8]

OR

Q2) a) Explain security architecture in detail with suitable diagram. [10]

b) What is mechanism in security? Discuss any one mechanism in detail.[8]

Q3) a) What secret key and cryptography? Discuss both with suitable example. [8]

b) Explain Triple DES algorithm with advantages over DES algorithm. [8]

OR

Q4) a) Explain RC4 algorithm in detail [8]

b) What is ciphering? Explain any two ciphering technique with suitable example. [8]

Q5) a) Differentiate public key and private key cryptography with suitable example. [8]

b) What key management in security? Explain any one algorithm for key management. [8]

OR

P.T.O.

- Q6)** a) Encrypt message using ECC algorithm. Take any message as a sample. [8]
b) What is man-in-middle attack? Discuss with suitable example. [8]

SECTION - II

- Q7)** a) What is Kerberos? Explain working principles of it in detail. [10]
b) Discuss PKI in detail. [8]

OR

- Q8)** a) What is MD5? Explain MD5 in detail with its applications. [10]
b) What hash function? Differentiate hash function and MAC with formulae. [8]

- Q9)** a) Explain design principle of Firewall. [8]
b) Differentiate TLS and SSL. [8]

OR

- Q10)** a) Discuss working principles of Intrusion Prevention System. [8]
b) Differentiate IDS and Intrusion Prevention System. [8]

- Q11)** a) What Electronic commerce security? Explain SET in short. [8]
b) What is PGP? Describe it in detail. [8]

OR

- Q12)** Write a short note on followings. [16]
a) PGP
b) Smart Cards
c) PEM
d) S/MIME



Total No. of Questions : 8]

SEAT No. :

P3631

[Total No. of Pages : 3

[4859] - 223

B.E (PETROCHEMICAL)
REACTION ENGINEERING - II
(2008 Pattern) (Semester - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in two separate answerbooks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data where ever necessary.*
- 5) *Use of steam tables and electronic calculator is allowed.*

SECTION - I

Q1) Tertiary Butyl Alcohol, an important octane enhancer, is produced by [16]
liquid phase hydration of isobutene over a catalyst.

- a) Propose possible reaction mechanisms based on Langmuir Hinshelwood theory.
- b) Derive a rate law assuming the surface reaction is rate-limiting

Q2) A laboratory packed bed reactor, housing 1 Kg catalyst, yields following [18]
kinetic data under a condition of very large recycle of product flow. Feed
concentration of A may be taken as 10 mol/m^3 .

CA	1	2	3	6	9
mol/m^3					
$v_0 \text{ lit / hr}$	5	20	65	133	540

Reaction is $2A \rightarrow R + S$. Find the amount of catalyst needed for 95% conversion for a flow rate of 10 kmol/hr feed stream having concentration of A as 3.6 mol/m^3 assuming the gas phase and solid phase mixing behaviour in the reactor to be:

- a) Plug Flow type
- b) Mixed Flow type

P.T.O

Q3) Diffusion-free kinetics of a gas phase catalytic reaction $A \rightarrow 2R$ is given [16] as $-r_A = 0.17 C_A^2$ mol/m³cat.s. Calculate the catalyst volume needed to achieve 80% conversion of pure A fed at the rate of 1500 Kmol/hr assuming

a) Negligible pore diffusion resistance and
b) Strong pore diffusion resistance. (Take catalyst pellet size as 10 mm and effective pore diffusivity to be 2.8×10^{-6} m²/m cat.s)

Q4) Discuss in brief

- a) Optimum pellet diameter in fixed bed reactor [16]
- b) Various effects of pore diffusion
- c) industrial use of fluidized bed reactor
- d) Mechanisms of catalyst poisoning

SECTION - II

Q5) a) Sketch and explain typical concentration profiles for various kinetic [4] regimes obtained in gas-liquid reactions.

b) Derive relationship giving enhancement factor when all reaction occurs instantaneously in the liquid film. [12]

Q6) An acidic impurity A in a gaseous stream is to be removed so as to [18] reduce its partial pressure from 750 Pa to 40 Pa (total pressure is 200 KPa) by reacting it with a base B dissolved in water in a packed tower operated in a counter-current manner. Overall gas side mass transfer coefficient is 0.0065 mol/hr.m³.Pa. Gas side resistance to mass transport in absence of the reaction is 30% whereas the liquid film contributes the remaining 70% resistance. Henry's constant is 45 Pa.m³/mol. L/G ratio is 5 times the minimum required for plain absorption. Calculate minimum concentration of B needed at the top of the tower to ensure minimum height of the tower. Also calculate this minimum height.

- Q7)** a) Explain shrinking unreacted core model employed in solid-gas reactions. **[10]**
- b) Spherical particle of ZnS with initial diameter of 5 cm is subjected to roasting in presence of air. Roasting reaction yields SO₂ as also the layer of ZnO. Molar density of solid may be assumed to be 0.07 mol/cm³. Diffusivity of gas through the product layer is 0.06 cm²/s. Calculate the time required for 85% conversion of the particle. **[6]**
- Q8)** a) Give examples of fixed bed and fluidized bed reactors from process industry. **[8]**
- b) Compare hydrodynamic behaviour of non-ideal reactors with that of ideal reactors. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3182

[Total No. of Pages :3

[4859]-224

B.E. (Petrochemical) (Semester - I)
PROCESS DYNAMICS AND CONTROL
(2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Attempt Q1 or 2, Q3 or 4, Q5 or 6 Q7 or 8, Q9 or 10, Q11 or 12.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket Calculator and steam table is allowed.*
- 5) *Assume Suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the characteristics of the first order systems in detail. [8]
b) Explain the objectives of process dynamics and control. [8]

OR

- Q2)** a) Explain different types of input functions to study the transient response of a system. [8]
b) Explain the significance of time constant and damping coefficient for the first order and second order system. [8]

- Q3)** a) Derive the overall transfer function for the negative feedback system for a servo problem. [8]
b) With the help of a neat sketch obtain the transfer function for N-identical non-interacting system in series. Compare the dynamic response of non-interacting and interacting system. [8]

OR

- Q4)** a) For a second order system define the following with a neat diagram [10]
i) Overshoot
ii) Period of oscillation

P.T.O.

- iii) natural period of oscillation
 - iv) Rise time
 - v) Ultimate value of response and
 - vi) Maximum values of response.
- b) Distinguish between negative feedback and positive feedback, servo problem and regulatory problem [6]

- Q5)** a) Explain the selection of control modes for various process parameters control operation. [9]
- b) Explain the working of a feedback loop. [9]

OR

- Q6)** a) Explain the selection of control valve characteristics for process control operations. [9]
- b) Explain the significance of lock diagram reduction of a control system. [9]

SECTION-II

- Q7)** a) A proportional controller having gain K_c is used to control two non-interacting liquid level tanks having time constant 2 and 2.5 respectively For the unity feedback control system. Determine the stability of the system using Routh criterion. [10]
- b) Draw the bode diagram for the first order system. [8]

OR

- Q8)** a) Explain the stability of the system and setting of controller gain for the system following $G(s) = \frac{K_c}{s(s+1)(s+3)}$ using Routh criterion. [9]
- b) Derive the amplitude ratio and phase angle for the proportional derivative control. Draw the Bode diagram for the PD controller. [9]

- Q9)** a) Explain the cascade control scheme for the reactor control. [8]
b) Explain the adaptive control strategy [8]

OR

- Q10)**a) Explain the split range control strategy with example. [8]
b) Explain inferential control strategy with example. [8]

- Q11)**a) Explain the use of SCADA system in Petrochemical Process Plants. [8]
b) Explain the detail construction features of PLC. [8]

OR

- Q12)**a) Explain the Distillation Column Control Strategy [8]
b) Explain the Heat Exchanger Control Strategy [8]



Total No. of Questions : 12]

SEAT No. :

P3183

[Total No. of Pages :3

[4859]-225

B.E. (Petrochemical Engineering) (Semester-I)

ENVIRONMENTAL ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answers any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn, wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume Suitable data, if necessary.*

SECTION-I

- Q1)** a) What do you mean by CDM? What are the criteria on which CDM can be applicable? Discuss the CDM Projects in Renewable energy [8]
- b) Define Hazardous waste. What are the different methods to dispose/treat hazardous wastes? [8]

OR

- Q2)** a) State three adverse effects of population growth on the environment.[4]
- b) Discuss in detail about major precautions to be taken to handle and treat Biomedical waste. [7]
- c) Describe aquatic eco system with neat diagram [5]

- Q3)** a) Hot gases from a foundry operation are sent to a fibre filter made of glass wool fibres of 10 microns diameter. The thickness of fibre material is 2 mm. The gases containing particles of an average size of 1 micron, flow through the fiber material at a velocity of 0.6 m/s. Find the grade efficiency of the fiber material if the void fraction of latter is 0.96.

Density of gases = 0.0011 g/cm³

Viscosity of gases = 0.02 Cp

Diffusivity of 1 micron particles = 2.7×10^{-7} Cm²/s [10]

P.T.O.

- b) With the help of flow diagram, explain working, advantages & disadvantages of suspended particulate matter (SPM) removal in Electrostatic precipitator (ESP). [6]

OR

- Q4)** a) Discuss the principle, working, advantages and disadvantages for removing particulate matter from gas streams in a Scrubber [10]
- b) Give the detailed classification of Primary and Secondary air pollutants with their adverse effects for any two each. [6]

- Q5)** a) Discuss with neat sketches different types of 'plume behaviors' with the conditions required for formation of these plumes. [9]
- b) Discuss the Meteorology factors influencing air pollution. [9]

OR

- Q6)** Write a short note on following: (Any Four) [18]
- a) Source Correction method for air pollution
- b) Carbon credits
- c) Control of NO_x in a complex fertilizer plant.
- d) Environmental laws for air pollution
- e) Temperature lapse rates and stability
- f) Adsorption technique for air pollution control

SECTION-II

- Q7)** a) What are various types of water pollutants And their effects? [8]
- b) What is the significance of COD/BOD ratio? Give the limitations of BOD test. [4]
- c) Discuss the role of MPCB & CPCB. [4]

OR

- Q8)** a) Write the detailed classification of solids found in waste water. [5]
b) Name at least 4 physical and chemical waste water characteristics & their significance. [7]
c) Discuss general standards for quality of water for different purposes. [4]

- Q9)** a) Discuss principle, construction, working, advantages and disadvantages of Activated sludge process (ASP) with neat sketch. [10]
b) Compare between the Anaerobic and Aerobic systems (Minimum 5points) [6]

OR

- Q10)** a) What is importance of primary treatment in waste water treatment? Explain the various methods for removal of suspended solids.. [8]
b) Explain Rotating biological contactors (RBC) process for waste water treatment. Draw the flow chart for conventional RBC process. [8]

- Q11)** a) Discuss the sources and method of treatment for Refinery & Petrochemical plant liquid waste with neat sketch. [9]
b) Discuss principle, construction, working, advantages and disadvantages of 'Up-flow Anaerobic Sludge Blanket' (UASB) process with neat sketch. [9]

OR

- Q12)** Write a short note on (Any four) [18]
a) Trickling filter
b) OSHA
c) ISO 14000
d) Importance of regulations for hazardous waste.
e) Significance of DO
f) Sanitary land filling operations



Total No. of Questions : 12]

SEAT No. :

P3184

[Total No. of Page : 5

[4859]-227

B.E. (PETROCHEMICAL ENGINEERING)

Novel Separation Processes

(2008 Pattern) (Elective-I)

Time : 3Hours]

[Maximum Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn and well commented*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket Calculator and steam tables, is allowed.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) Attempt Any Three from the following **[18]**

- a) Compare Equilibrium based and Rate based separation Processes.
- b) Classify membrane separation processes by giving examples.
- c) Write a brief note on: adsorptive bubble separation techniques.
- d) Explain the process principles involved in Froth Flotation. Indicate its Industrial applications.
- e) Explain in brief the energy requirements for chemical engineering separation processes.

OR

Q2) Classify the models for gas separation by membranes. Develop crosscurrent model for membrane separation processes. State the assumption made. Discuss the solution strategy for different cases. **[18]**

Q3) A liquid containing dilute solute A at a concentration 4×10^{-2} kgmol/m³ is flowing rapidly by a membrane of thickness, 3×10^{-5} m. The solute diffuses through the membrane and its concentration on the other side is 0.45×10^{-2} kgmol/m³. The mass transfer coefficient k_{c1} is large and can be considered as infinite and $K_{c2} = 2.22 \times 10^{-5}$ m/s. Data: Distribution coefficient = $K' = 1.45$ and Diffusivity, $D_{AB} = 9 \times 10^{-11}$ m²/sec in the membrane.

P.T.O.

- a) Derive the equation to calculate the steady state flux. N_A and make a sketch.
- b) Calculate the flux and concentration at the membrane interfaces

[16]

OR

- Q4)** a) A heart-lung machine uses a 0.175 mm silicone rubber membrane with a permeability of $6.4 \times 10^{-7} \text{ cm}^3 \text{ O}_2 \text{ (STP) mm/s.cm}^2\text{cmHg}$. The machine is to supply $355 \text{ cm}^3/\text{min}$ of oxygen to a patient, where the partial pressure of oxygen in the blood is the equivalent of 35 mmHg. The machine is supplied with pure oxygen at 700 mmHg, so gas film resistance can be neglected. If the resistance on the blood side were neglected also, estimate the membrane area for this application? [8]
- b) Discuss in detail with neat sketches various membrane modules. State merits and demerits of each module with applications in membrane separation processes rate. [8]

Q5) A membrane is to be used to separate a gaseous mixture of A and B in one of the chemical complex near Mumbai. The following information is known:

Feed flow rate	= $2 \times 10^5 \text{ cm}^3 \text{ (STP)/s}$
Feed composition of A	= 0.5 mole fraction
Desired composition of reject	= 0.25 mole fraction
Thickness of membrane	= $2.5 \times 10^{-3} \text{ cm}$
Pressure on feed side	= 100 cmHg
Pressure on permeate Side	= 25 cmHg
Permeability of A, P_A	= $20 \times 10^{-10} \text{ cm}^3\text{(STP).cm}/(\text{s.cm}^2\text{.cmHg})$
Permeability of B, P_B	= $10 \times 10^{-10} \text{ cm}^3\text{(STP).cm}/(\text{s.cm}^2\text{.cmHg})$

Assuming complete mixing model, calculate the following: [16]

- a) the permeate composition
- b) the fraction permeated
- c) membrane area

OR

Q6) Write short note on (Any Three): [16]

- a) Selection criteria for separation processes
- b) Reverse Osmosis -Principles and applications
- c) Diffusion type model for Reverse osmosis
- d) Hydrotopes
- e) Surfactant Based separation processes

SECTION-II

Q7) Answer Any Three from the following: **[18]**

- a) Explain the process principles involved in Ion Exchange separations
- b) Name five of the most important commercial adsorbents? What is the distinguishing feature of the molecular-sieve zeolites?
- c) Explain different types of adsorption isotherms models by giving mathematical equations of each adsorption isotherm models.
- d) Copper ions are removed from aqueous solution by an ion exchange resin. Pilot-scale tests where 94.6 ml/min of solution was passed through a cylindrical bed of resin 0.0254 m in diameter and 0.36 m high gave a breakthrough time of 8.0 minutes, by which time 60% of the bed height had been fully spent. The plant-scale tow Find

i) New breakthrough time;

ii) Diameter required;

Assume that “zone” of resin in transition is to be the same in both towers.

OR

Q8) Activated carbon is used to adsorb ethanol vapor from an airstreams. The laboratory experiment to investigate this has a bed 5 cm in diameter and 16cm high. Exit data for an input of 0.750 liter/second are as follows: **[18]**

Time (hours)	0	3	3.5	4	4.5	5	5.5	6.0	6.2	6.5	6.8
C/C ₀	0	0	0.002	0.030	0.155	0.396	0.658	0.903	0.946	0.978	0.993

Do as follows:

- a) Determine breakthrough time if break point is $C/C_0 = 0.05$
- b) Calculate the height of a new column of the same diameter that has breakthrough at 8.5 hours.
- c) Calculate the diameter of this new column if it is to process 3 liter/min.

Q9) From Darcy's Law, the velocity through a packed bed for a given pressure

drop (P) is given by:
$$u = \frac{\phi P d^2 p}{l \eta}$$

Where,

ϕ = Darcy's constant

P = Pressure drop

d_p = Particle diameter

l = Length of column

η = Viscosity of the mobile phase

Also, from the analysis of the Van Deemter equation, for a well packed column and for a highly retained solute, it is found that:

$$H_{\min} = 2.48d_p$$

and the velocity at H_{\min} is equal to

$$1.62D_m / d_p$$

Where D_m is the diffusivity of the solute in the mobile phase.

From the above information, derive an analytical expression for the maximum efficiency obtainable for a column in terms of these parameters, if the maximum allowable pressure drop is P. [16]

OR

Q10)a) Two solutes have a relative retention of $\alpha = 1.08$ and capacity factor, $k_1 = 5$ and $k_2 = 5.5$. The number of theoretical plates is nearly the same for both the compounds. How many plates are required to give a resolution of 1.5? and of 3? If the plate height is 0.2 mm. how long must the column be for a resolution of 1.5? [8]

b) In gas chromatography, a plot of HETP as a function of the mobile phase velocity is described by the Van Deemter equation:

$$\text{HETP} = A + B/u + Cu$$

Physically, what do the terms A, B and C represent? Calculate the optimum value of the mobile phase velocity and the plate height in terms of these parameters. [8]

Q11)a) You are working as Separation technologist in one of the chemical complex near Mumbai. Your company has been contracted to purify a new peptide mixture, which has been produced by PQR Company. Your research department has optimized the separation on two existing columns and the production department needs to know which column can operate at the higher volumetric flow rates. Since the stationary phase chemistries are slightly different, each column is operated at different mobile phase mixture so you will need to take this consideration for your calculations

Data:

[16]

Column-I	Column-II
Mobile Phase 50/50 MeOH/H ₂ O by weight $d_{col} = 0.55$ cm $L_{col} = 25$ cm $\epsilon_c = 0.4888$ $dp = 10 \mu\text{m}$	Mobile Phase 70/30 MeOH/H ₂ O by weight $d_{col} = 1$ cm $L_{col} = 50$ cm $\epsilon_c = 0.5330$ $dp = 10 \mu\text{m}$

OR

Q12) Write Short notes on (Any Three)

[16]

- Reactive Separations
- Bioseparations
- Supercritical Fluid Extraction
- Parametric Pumping
- Zone Melting



Total No. of Questions : 12]

SEAT No. :

P3632

[Total No. of Pages : 3

[4859] - 228

B.E. (Petrochemical Engineering)

ELEMENTS OF FLUIDIZATION ENGINEERING

(2008 Pattern) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) With help of suitable examples discuss the advantages of fluidization engineering. [8]
- b) How solid particles behave like fluid - explain with help of neat diagram. [8]

OR

- Q2)** a) With help of neat diagram explain different regimes of fluidization. [8]
- b) Obtain the mathematical expression to calculate minimum fluidization velocity. [8]

Q3) Write short notes on: [16]

- a) Minimum fluidization velocity.
- b) Quality of Fluidization.
- c) Spouting Bed.

OR

P.T.O.

- Q4)** a) With help of neat diagram discuss methods of Geldart's classification of particles. Explain the importance of such classification. [8]
- b) A bed of angular sand of mean sieve size $500 \mu\text{m}$ is fluidized by air. The particle density is 2500 kg/m^3 , $\mu_{\text{air}} = 18.4 \times 10^{-6} \text{ kg/ms}$; $\rho_s = 1.2 \text{ kg/m}^3$. If 20 kg of sand be charged to a bed of 0.25 m diameter and bed have incipient fluidization height of 0.5 m, find (i) porosity at minimum fluidization condition, (ii) the pressure drop across the bubbling bed and (iii) the incipient fluidization velocity. [8]
- Q5)** a) Name three classical methods and three advanced methods of measurements in Fluidized bed. Elaborate one method from each group with help of neat diagram. [9]
- b) Discuss the hydrodynamic similarities and dissimilarities between fluidized bed and bubble column reactors. [9]

OR

- Q6)** a) With help of neat diagram explain particle entrainment and carryover in fluidized bed. How can it be reduced? [10]
- b) Discuss the process of Coalescence and bubble break-up with help of neat sketches. Also indicate the source of solids inside bubble and its effects. [8]

SECTION - II

- Q7)** a) How can fluidized bed be used as Heat Exchangers? Explain with help of suitable example. [8]
- b) With help of diagram explain how fluidized bed can be used for drying solids. [8]

OR

- Q8)** a) Write down the equation of heat transfer for fluidized bed operation. Discuss the advantage of fluidized bed based on heat transfer characteristics. [8]
- b) How are the solid particles getting mixed within a fluidized bed reactor? Highlight the key challenges involved in proper mixing. [8]

- Q9)** a) With help of all the important assumptions obtain Kunii - Levenspiel Model of flow through a Fluidized Bed Reactor. In this context explain Davidson Bubble movement through the bed. [12]
- b) How cohesive moist solid can be fluidized? Explain with help of neat diagram. [6]

OR

Q10) Write short notes on : [18]

- a) Bed internals.
- b) Effect of pressure in fluidized bed operation.
- c) Agglomeration and Sintering.
- d) Bubble movement through fluidized bed.

- Q11)** a) Draw a neat diagram of new generation FCC reactor, provide process operating conditions. Briefly explain about catalyst regeneration. [10]
- b) What are the major challenges of fluidized bed scale-up? [6]

OR

- Q12)** a) Explain the operation of Chemical Looping Reactor with help of neat diagram. [8]
- b) With help of neat sketch explain the usage of fluidized bed for thermal power plant operation. [8]



Total No. of Questions : 8]

SEAT No. :

P3633

[Total No. of Pages : 2

[4859]-229

B.E. (Petrochemical Engineering) (Semester - I)

GREEN CHEMISTRY

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Discuss properties of super-critical carbon dioxide which make it relevant to green processing.

b) Explain the role of environmental management systems and ecolevels in practice of green chemistry.

[16]

Q2) Can biomass be used as a green feedstock for chemicals manufacture in India? Elaborate with supporting evidence. [16]

Q3) State and discuss in detail the twelve principles of green chemistry with actual examples. [16]

Q4) a) Explain the concept of atom economy with help of an example.

b) Discuss the following processes.

i) Photochemical synthesis.

ii) Phase Transfer Catalysis.

[18]

P.T.O.

SECTION - II

- Q5)** a) Discuss green synthesis of adipic acid.
b) Discuss electro-organic synthesis with help of an example. **[16]**
- Q6)** a) Compare the traditional process with green process for manufacturing lactic acid.
b) Discuss process intensification from green chemical engineering point of view. **[16]**
- Q7)** a) Discuss how green chemistry approach towards process safety.
b) Discuss possible green processes for preparation of aniline. **[16]**
- Q8)** Write notes : **[18]**
a) Use of solar energy in chemical manufacture.
b) Roots and prevention of global warming.



Total No. of Questions : 12]

SEAT No. :

P3161

[Total No. of Pages : 4

[4859] - 23

B.E. (Civil)

**Statistical Analysis & Computational Methods in Civil Engineering
(Elective - IV) (2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Find the mean, median, variance and standard deviation for the following data. **[10]**

Class interval	5-15	15-25	25-35	35-45	45-55	55-65	65-75
No. of observations	2	0	8	36	110	78	66

- b) What do you mean by sample & population. Enumerate various methods of sampling. **[6]**

OR

- Q2) a)** The yearly rainfall for a period of 30 years is given the following table. Draw the histogram and determine mean, variance and standard deviation for this data **[10]**

Class interval	28-30	30-32	32-34	34-36	36-38	38-40	40-42	42-44	44-46	46-48
No. of observations	2	4	2	6	4	1	3	5	1	2

P.T.O.

b) Explain how statistics can be used in civil engineering. [6]

Q3) a) What do you mean by a standard normal distribution. State the properties of normal distribution. [6]

b) Find the following probabilities for the standard normal distribution Z: [10]

i) $P(-0.5 \leq Z \leq 1.1)$.

ii) $P(-0.38 \leq Z \leq 1.72)$.

iii) $P(0.2 \leq Z \leq 1.4)$.

iv) $P(-1.5 \leq Z \leq -0.7)$.

v) $P(Z \geq 1.6)$.

Use the standard normal distribution table.

Standard Normal Distribution Table

Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Area	0.000	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.258	0.2881	0.3159

Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641

Z	1.9	2.0	2.1	2.2	2.3	2.4	2.5
Area	0.4713	0.4772	0.4821	0.4861	0.4893	0.4918	0.4938

OR

Q4) a) If 2% of the items made by a factory are defective. Find the probability P that there are 3 defective items in a sample of 100 items. [6]

b) If the marks obtained by students are normally distributed with mean = 68 and standard deviation = 2.5. Find the percentage of students who have obtained marks. [10]

i) Between 66 and 71

ii) Between 69.5 and 70.5,

iii) At least 72.

Q5) a) Explain least square criteria for best fit curve. [6]

b) Find the correlation coefficient for the following data [12]

x	63	72	76	70	71	65	70	74	68	61
y	8385	8330	8325	8320	8330	8325	8280	8280	8300	8265

OR

Q6) a) Explain Linear and Multiple regression. [6]

b) Using interpolation formula, find $f(3.75)$ for the following data. [12]

x	2.5	3.0	3.5	4.0	4.5	5.0
f(x)	24.145	22.043	20.225	18.644	17.262	16.047

SECTION - II

Q7) a) Solve the following equations by Gauss elimination method. [6]

$$10x - 2y + 3z = 23; 2x + 10y - 5z = -33; 3x - 4y + 10z = 41.$$

b) Solve the following system of equations by Gauss-Seidel method. [10]

$$28x + 4y - z = 32; x + 3y + 10z = 24; 2x + 17y + 4z = 35$$

OR

Q8) a) Solve the following using Gauss - Jordan Method. [6]

$$x + y + z = 9; 2x - 3y + 4z = 13; 3x + 4y + 5z = 40$$

b) Solve the following system of equations by Gauss-Seidel method. [10]

$$8x - y + z = 18; 2x + 5y - 2z = 3; x + y - 3z = -6$$

Q9) a) Explain Secant Method. [6]

b) Using false position method, Find the positive root of $x^3 - 2x - 50 = 0$.

[10]

OR

Q10) a) Find the root of the following equation using bisection method. [6]

$$x \log_{10} x = 1.2 \text{ lying between 2 and 3.}$$

b) Find the real root of $x.e^x - 2 = 0$ correct to three decimal places using Newton-Raphson method. [10]

Q11) a) Find the area under the curve using Simpson's $\frac{1}{3}$ rd rule for the following data. [9]

x	0	300	600	900	1200	1500	1800
y	135	149	157	183	201	205	193

b) For the data given in Q.(11.a), find the area under the curve using Simpson's $\frac{3}{8}$ th rule. [9]

OR

Q12) a) Find the value of the following integral by Gauss - quadrature formula

$$\int_1^2 \frac{dx}{1+x^3}. \quad [9]$$

b) Find the area under the curve using trapezoidal rule. [9]

x	0	0.125	0.25	0.375	0.5	0.625	0.75	0.875	1.0
y	1	0.888	0.8	0.727	0.666	0.615	0.571	0.533	0.5



Total No. of Questions : 8]

SEAT No. :

P3510

[4859]-234

[Total No. of Pages : 5

**B.E. (Petrochemical Engineering)
REFINERY PROCESS DESIGN
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of steam tables and electronic calculator is allowed.*
- 5) *Make use of K Charts, LMTD correction factor curves and Gillil and curve given in the end wherever appropriate.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

Q1) Vapor mixture leaving a distillation column consists of 75 Mol% n-butane, 20 Mol% n-pentane, and 5 Mol% n-hexane, Column pressure is 7 bar. Column employs a total condenser from which reflux is returned to the column. Calculate temperatures of vapor from the column top and reflux liquid, If reflux ratio is 3, calculate vapor and liquid compositions for two theoretical plates below the top plate. **[18]**

Q2) Feed to a C2 splitter is 40% vaporized liquid having 50% ethylene and 50% ethane (Mol%). The column operates at 7 bar pressure, Purities of both top and bottom products are expected to be 99.5%. Calculate minimum reflux ratio needed using Underwood equations. Assuming operating reflux to be 1.2 times the minimum, calculate the theoretical stages needed for the separation Assuming plate efficiency to be 70% and tray spacing to be 65 cm, calculate height of the tray column needed for the purpose. **[16]**

Q3) a) Discuss Packie Charts. **[8]**
b) Explain how coil outlet temperature (COT) is determined in ATU design. **[8]**

P.T.O.

- Q4)** a) Explain troubleshooting of flooding and weeping problems in distillation column. [8]
b) Discuss typical control schemes used in distillation operation. [8]

- Q5)** a) Describe design of a shell and tube heat exchanger for a specified duty with reference to the following : [14]
i) Placement of fluids
ii) Heat transfer coefficients
iii) Number of passes
iv) Utilization of Pressure drops available
v) Optimum Baffle spacing
b) State possible heat transfer coefficient values in the following situations:[2]
i) Vapor condensing
ii) Heavy oil boiling

- Q6)** a) Discuss in brief method for fired heater design. [10]
b) Discuss constructional features of fired heater used in refinery operations.[6]

- Q7)** With reference to centrifugal pump operation and design, discuss : [18]
a) NPSH
b) Energy saving possibilities.
c) Operating point

OR

- Q8)** Discuss :
a) Anti - surge [5]
b) Centrifugal pump working principle [5]
c) Selection of a process pump [6]

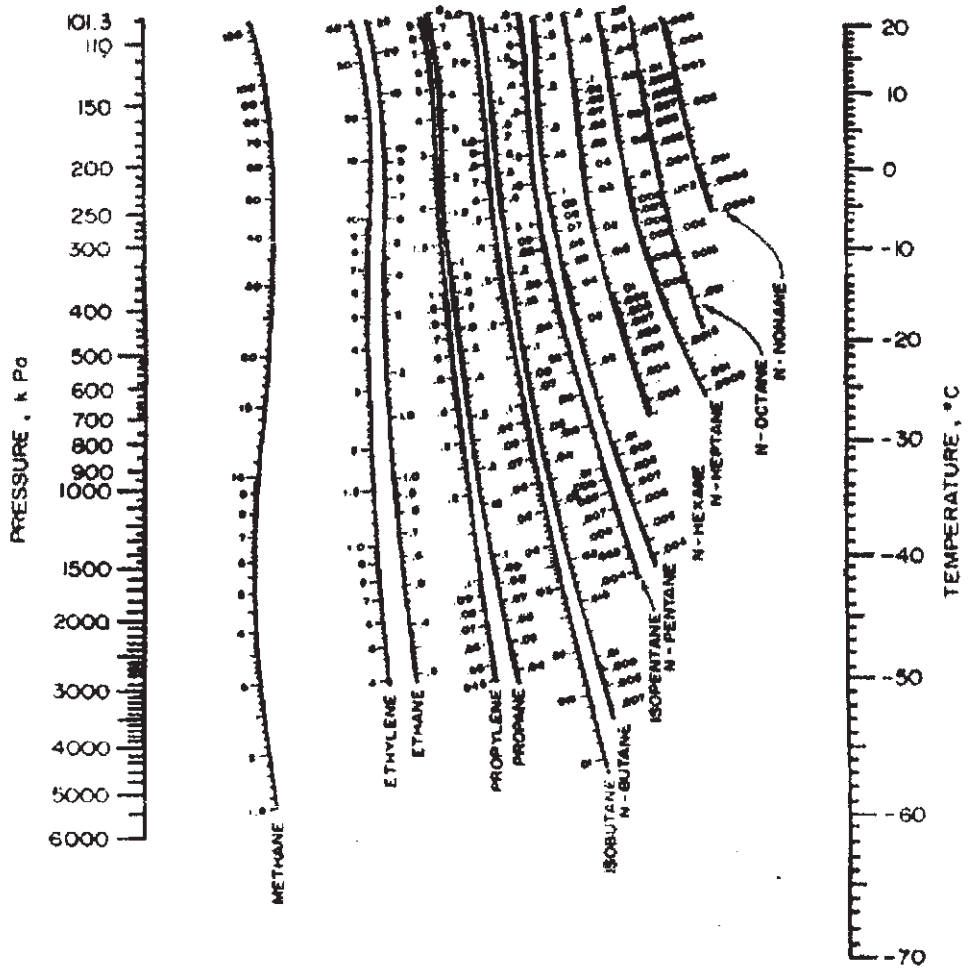


FIG 1: K-Chart for low temperature range

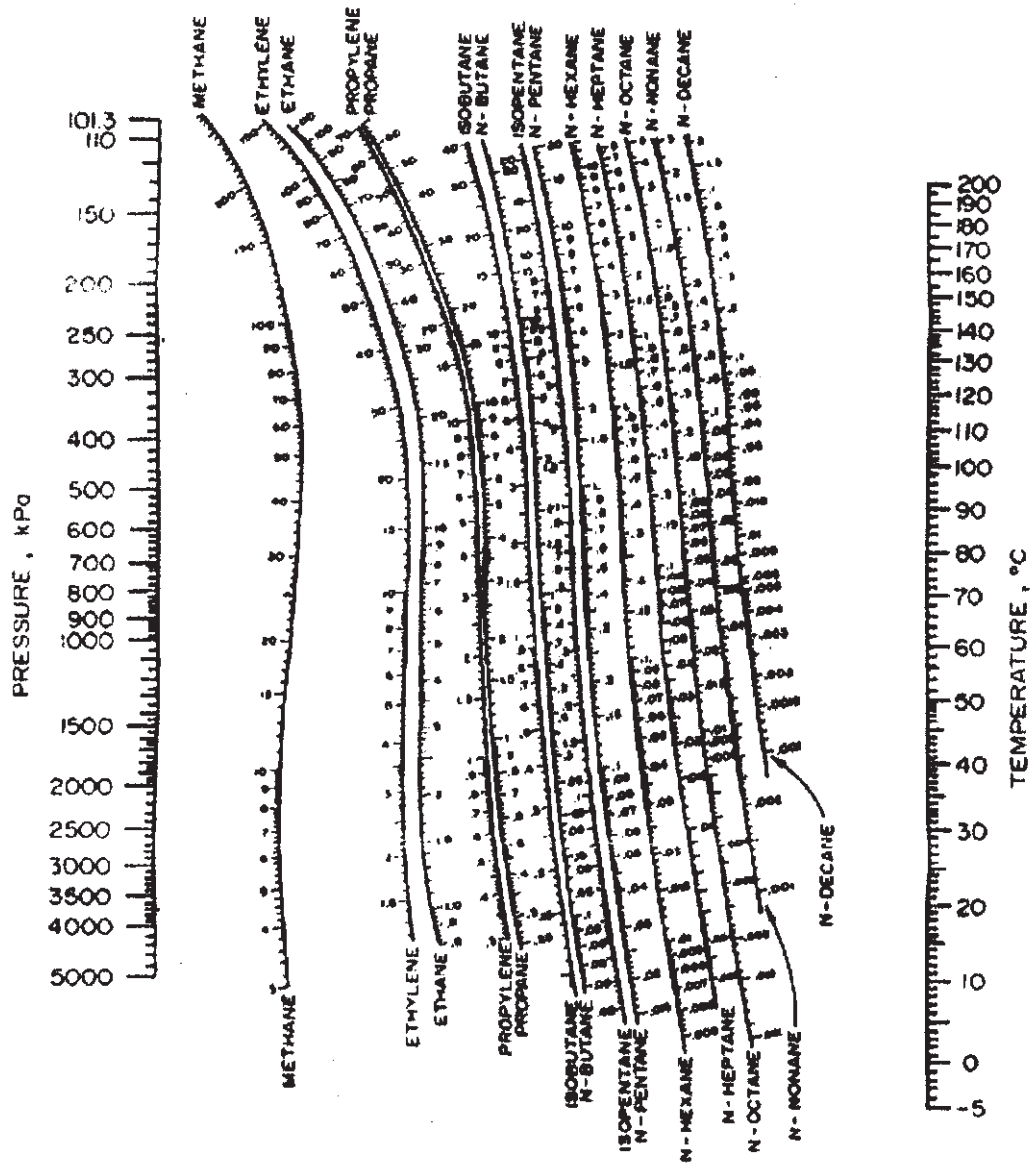


FIG 2: K-Chart for high temperature range

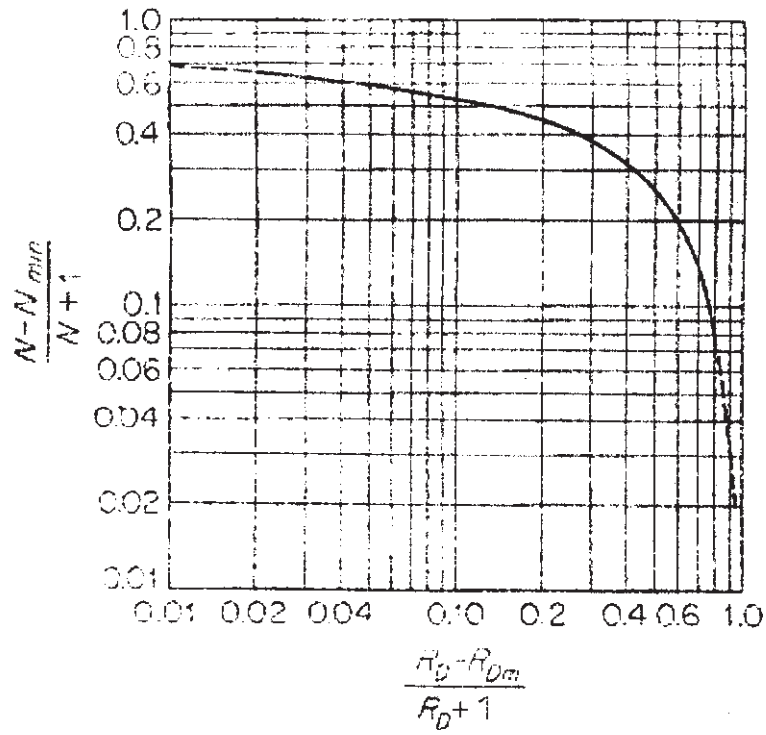


FIG 3: Gilliland Curve



Total No. of Questions : 8]

SEAT No. :

P3532

[4859] - 237

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)
FINE CHEMICAL INDUSTRIES
(Elective - III) (2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from section - I and three questions from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Give pertinent examples of fine and bulk chemicals. [10]
b) Discuss environment friendly manufacture of fine chemicals. [8]
- Q2)** a) Explain role of catalysis in fine chemical processes. [8]
b) Discuss future trends in Indian fine chemicals sector. [8]
- Q3)** a) Discuss separation processes in context of fine chemicals manufacture. [10]
b) Discuss markets for fine chemicals at world level. [6]
- Q4)** a) Explain the concept of mixed plants in fine chemical sector. [10]
b) Discuss with examples how waste production is taken care of in fine chemical sector. [6]

SECTION - II

- Q5)** a) What steps will you advise if a batch operation is to be converted into continuous one? [12]
b) What do you mean by 'scale down'? [6]

P.T.O.

- Q6)** a) Discuss in detail manufacturing process for a dye intermediate. [10]
b) What is the effect of scale of operation on economy of a process plant in fine chemical sector? [6]
- Q7)** a) Write a note on ion exchange resins as catalysts for fine chemicals synthesis. [10]
b) Discuss emerging feed-stocks for manufacturing fine chemicals. [6]
- Q8)** Compare : [16]
a) Supercritical Extraction vs Solvent Extraction.
b) Batch vs continuous operation.



Total No. of Questions : 12]

SEAT No. :

P3538

[Total No. of Pages : 3

[4859]-239

B.E. (Petrochemical Engg.)

RENEWABLE ENERGY SOURCES

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Name five different renewable sources of energy – explain why are they termed as renewable? [9]
- b) Elaborate the challenges associated with renewable energy sources and how to mitigate them. [9]

OR

- Q2)** a) Give a comparative account of total energy consumption with a special emphasis on renewable energy basket for the advanced and developing countries of the world. [10]
- b) Non conventional energy resources are a must for sustainable world - Explain and elaborate with help of suitable examples. [8]

- Q3)** a) Explain the various techniques and methods of measurement of solar radiation, draw neat sketches. [8]
- b) Discuss the new advancement of photo voltaic cell technologies and the challenges to utilize abundant sunlight available in India. [8]

OR

- Q4)** a) Give your critical comment on solar cell based independent village versus connecting the available energy on the main grid for larger distribution.[8]

P.T.O.

- b) How water desalination can be done effectively with help of solar energy explain in details. [8]

- Q5)** a) Name different types of gasifiers can be designed to process Municipal Solid Wastes generated in cities - discuss Design aspects. [10]
b) What are second generation bio-fuel how do they differ from the first generation bio-fuels? [6]

OR

- Q6)** Composition of a vegetable oil is given below : [16]
C 16:0 = 15%, C 18:0 = 7%, C 18:1 6 = 21.5%, C 18:1 12 = 2.6%, C 18:2 9, 12 = 53.6% and C 18:3 5, 9, 13 rest C 18: 1 6 signifies an 18 carbon fatty acid chain with one double bond located at carbon 7.

Calculate amount of methanol required for trans-esterification of 5.7 lit of this oil, if 72% excess methanol based on stoichiometric requirement needs to be used for complete conversion.

Assume density of soybean oil to be 0.88 and that of methanol 0.8 kg/lit.

If overall 83.4% conversion be achievable, calculate mass of Biodiesel and glycerol produced. Consider 52% of vegetable oil used undergoes saponification in presence of homogeneous NaOH catalyst.

SECTION - II

- Q7)** a) Discuss the major challenges faced by OTEC technology. Highlight how the commercial feasibility of OTEC can be increased. [8]
b) Give a detailed account of Wind Energy potential in India. Compare advantages and disadvantages of wind energy. [8]

OR

- Q8)** a) With help of neat diagram discuss the design features of helical turbine. [8]
b) Comment on origin and distribution of geothermal energy in Indian subcontinent. [8]

- Q9)** a) With help of neat diagram explain various parts of wind turbine generator units. [8]
b) Explain the concept of Geotechnical Well and discuss the methods of extraction of energy out of it. [8]

OR

- Q10)** a) Explain the process of wet steam system of geothermal energy extraction provide neat sketch. [8]
b) Describe various energy extraction technologies used with hydrothermal (geothermal) resources. [8]

- Q11)** a) List down different types of fuel cells often used and compare between them based on types of electrolytes employed, operating ranges, fuel types and the oxidants utilized. [9]
b) Discuss the advantages and disadvantages of fuel cells. Write a detailed note on applicability of the Fuel Cells in Indian scenario. [9]

OR

- Q12)** a) Discuss the importance of storage of electrical energy. Name different types of cells can be utilized. Discuss operation of any one of the cell.[8]
b) With help of schematic diagram explain the principle of operation of Fuel Cells. Comment on Cathode, Anode and the type of Electrolytes.[10]



Total No. of Questions : 8]

SEAT No. :

P3534

[Total No. of Pages : 2

[4859] - 242

B.E. (Petrochemical Engineering)
POLYMER REACTION ENGINEERING
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve any three questions from each section.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain in what way the design considerations in Polymerization Reaction Engineering differ from monomer reaction engineering. [8]

b) Compare addition polymerization with condensation polymerization. [8]

Q2) a) Discuss Free radical polymerization with one industrial example. [12]

b) In case of free radical polymerization, derive the necessary equation of the rate of Initiation in terms of Initiator concentration. [6]

Q3) Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 7 gmole/lit, and the concentration of initiator is kept constant at 0.08 gmole/lit. Assume termination takes place only by combination. The constants are: [16]

$K_0 = 9 \times 10^{-6} \text{ sec}^{-1}$, $k_p = 166 \text{ lit/gmole.sec}$, $k_c = 1.0 \times 10^7 \text{ lit/gmole.sec}$, $f = 0.8$

The volume of the reactor filled by the reacting system is 3500 lit.

For a reaction time of 60 min, compute the following:

- a) The percentage of the styrene polymerized.
- b) The number average molecular weight of the product.

P.T.O.

Q4) Discuss their significance of the following terms with reference to polymer products. [16]

- a) Weight Fraction.
- b) First moment of P_j 's.
- c) Number Average Degree of Polymerization.
- d) Weight Average Degree of Polymerization.
- e) Number Average Molecular Weight.
- f) Weight Average Molecular Weight.

SECTION - II

Q5) a) Discuss what is a copolymer by giving examples of industrially important copolymers. [8]

b) Explain copolymer behavior based on monomer reactivity ratio. [8]

Q6) a) Discuss in brief Aqueous Emulsifier Solutions. [6]

b) Derive the necessary equation for the steady state population balance for the particles having 'n' radicals in emulsion polymerization. [10]

Q7) a) Explain the factors taken into consideration while mixing pattern for carrying out polymerization reaction. [9]

b) Discuss process control strategies employed in polymerization processes. [9]

Q8) Draw and discuss process flow diagram for the production of [16]

a) Nylon 66 and

b) Polystyrene.



Total No. of Questions : 12]

SEAT No. :

P3634

[Total No. of Pages : 3

[4859]-247

B.E. (Petroleum Engineering)

**ADVANCED INSTRUMENTATION AND PROCESS
CONTROL IN PETROLEUM INDUSTRY
(2008 Pattern) (Elective - I) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are the key characteristics of measuring instruments – Elaborate all of them. [8]
- b) Compare Analog and Digital Instruments. Explain conversion from Analog signal to the Digital mode and vice versa. [8]

OR

- Q2)** a) Describe the need of variable speed drive devices in Oil and Gas Industries. Discuss their principle of operation with help of neat diagram. [8]
- b) Give the classification of electric motors. Explain with neat diagram principle, construction and working of AC motor. [8]

- Q3)** a) How flow-rate of crude is measured? Briefly explain various instruments used to monitor crude transport through cross-country pipeline. [8]
- b) Define torque. Explain principle, construction and working of proximity torque sensor with neat diagram. [8]

OR

P.T.O.

- Q4)** a) Name three different ways by which level or crude stored in a tank can be measured – explain principle of operation of them as well. [10]
- b) With help of neat diagram explain the construction, principle and working of any temperature sensor. [6]
- Q5)** a) With help of neat diagram explain Gain and Time Constant for a first order system. [6]
- b) Draw and explain : [6]
- i) Rise time.
- ii) Response time.
- iii) Overshoot.
- iv) Decay ratio.
- c) Briefly explain the need of process control for upstream industry. [6]

OR

- Q6)** Write short notes on : [18]
- a) SCADA systems.
- b) Programmable Logic Controller.
- c) Controller Tuning.
- d) Individual modes of action for PID Controller.

SECTION - II

- Q7)** a) With help of schematic diagram explain Cascade Control. Discuss the controllers employed and the control mechanism in details. [9]
- b) Name various switches often used in oil and gas industry – Explain their principles of operation. [9]

OR

- Q8)** a) Name the ideal controllers for the following operations – justify your answer : [6]
- i) Product outlet of Crude Distillation Unit.
- ii) Gas pressure monitoring and control.
- b) With help of neat diagram explain remotely controlled fracturing process. [6]
- c) Differentiate between PLC and DCS. [6]

- Q9)** a) With help of neat diagram explain Dynamic Positioning of Floating Vessels for deep sea exploration. [8]
- b) What is kick? How can it be detected? Briefly explain kick detection and monitoring. [8]

OR

- Q10)** a) Draw a controlled logic diagram for Two Phase Separator – provide all necessary control connections and explain the control mechanism. [8]
- b) Explain with help of suitable case study any advanced control architecture for the under balanced drilling operation. [8]
- Q11)** a) Name four multiphase flow-meters, explain principle of operation of any two with help of neat diagram. [8]
- b) What are the technical challenges faced during production from subsea reservoirs – Explain with help of relevant examples. [8]

OR

- Q12)** Write short notes on (any three) : [16]
- a) ROV.
- b) Subsea Control.
- c) Automated Steam Injection Process.
- d) Emergency Shut-down.



Total No. of Questions : 6]

SEAT No. :

P3162

[Total No. of Pages : 3

[4859] - 25

B.E. (Civil) (Semester - II)

Geoinformatics

(Open Elective) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Define resolution and explain any 2 types. **[8]**

b) Explain EMR. State the characteristics of different frequencies. **[8]**

OR

a) Describe characteristics of LANDSAT 1 , 2 & 3. **[8]**

b) What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them. **[8]**

Q2) a) Write a note on: **[8]**

i) Image Rectification.

ii) Geo referencing.

b) What is false colour composite (FCC) Images? What are its advantages? **[8]**

OR

a) Explain Supervised and Unsupervised Classification. **[8]**

b) Explain any two satellite images and its application. **[8]**

P.T.O.

- Q3)** a) “Geometric” Corrections in Images under processing. [8]
b) Describe characteristics of IR Images. [10]

OR

- a) What is Digital Image processing and briefly explain its application. [10]
b) Write a note on ‘System Pour 1’ Observation de la Terre. [8]

SECTION - II

- Q4)** a) What is ‘MAP’? Describe different types of maps in brief. What are its limitations? [8]
b) Explain: [8]
i) Vector Model.
ii) Resolution.

OR

- a) Define GIS. Explain in detail its components. [8]
b) Write a note on: [8]
i) Data types in DBMS.
ii) Attributes.

- Q5)** a) Explain any one GIS software’s and write a detail account on its Modules. [8]
b) What is RDBMS? Explain the normal form with one example. [8]

OR

- a) Write a note ‘Buffering’. [8]
b) Describe ‘Raster’ data structure. Write advantages and disadvantages. [8]

- Q6) a)** Explain application of Geo Informatics in following areas: **[10]**
- i) Geotechnical Engineering.
 - ii) Water Resource management through canal irrigation.

- b) Write a brief note on “Role of GIS in Terrain Analysis”. **[8]**

OR

- a) Explain application of Geo Informatics with working flow charts in following areas: **[10]**

i) Road Survey and Investigations.

ii) Infrastructure Development.

- b) Write in detail Satellite Data acquisition. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1993

[Total No. of Pages : 2

[4859]-250

B.E. (Petroleum Engineering)

**a) : PETROLEUM REFINING TECHNOLOGY
(2008 Pattern) (Elective - II) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Give the composition of crude oil. Describe the various major components in detail. [8]
b) Explain the terms: Aniline point, API Gravity, Smoke point, Flash point. [8]
- OR
- Q2)** a) Draw a neat labeled flow diagram of the refinery. [8]
b) What do you mean by crude oil assay? Give its various components. [8]
- Q3)** a) What are the factors affecting the desalting operation? Draw a labeled diagram for the two stage electrostatic desalting. [8]
b) Discuss the operation of a vacuum distillation column. [8]
- OR
- Q4)** a) What do you mean by pump back reflux? Also describe the other kinds of reflux in the atmospheric distillation column. [8]
b) Enlist the various products of crude oil along with their approximate composition in terms of carbon number. [8]
- Q5)** a) Discuss the role of regenerator in the FCC. [9]
b) Write a note on the delayed coking unit. [9]

OR

P.T.O.

- Q6)** a) What is hydroprocessing? Discuss the expanded bed hydroprocessing. [9]
b) What is the need for air blowing of bitumen? Discuss the process of air blowing of bitumen. [9]

SECTION - II

- Q7)** a) Write a note on the various reforming catalysts. [8]
b) Discuss the sulphuric acid process for alkylation. [8]

OR

- Q8)** a) What is catalytic reforming? Give the reactions that take place in catalytic reforming. [8]
b) How will you increase the octane number of the reformat? Discuss the isomerization process. [8]

- Q9)** a) Why is propane used for deasphalting? Write a note on propane deasphalting. [8]
b) Explain the process of DILCHILL dewaxing. [8]

OR

- Q10)** a) What are the important properties considered in the preparation of the lube oil base stock? Explain. [8]
b) Explain the importance finishing processes for the preparation of lube oil base stock. [8]

- Q11)** a) What are the various methods used for the production of hydrogen in a refinery? Explain any one in detail. [9]
b) Discuss the various methods of waste water treatment in the refineries. [9]

OR

- Q12)** a) Give the importance of blending of the refinery products. Explain any one method. [9]
b) How is sulphur content regulated in the refinery products? Write a note on the Claus process for sulphur recovery. [9]



Total No. of Questions : 10]

SEAT No. :

P3195

[4859]-252

[Total No. of Pages : 3

B.E. (Petroleum Engineering)

NON CONVENTIONAL HYDROCARBON RESOURCES

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams should be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume additional data if necessary.*

SECTION - I

Q1) a) Explain following terms : Mudstone, Tight sand, Shale oil and Oil Shale, Extra heavy and Bitumen, CBM. **[10]**

b) What is a continuous accumulation system? **[5]**

OR

Q2) a) Give classification of Heavy and Extra Heavy Oil. **[10]**

b) What is meant by dual water system in shale? **[5]**

Q3) a) Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. **[10]**

No.	Depth in meters	Mineralogy percent			
		Quartz	Carbonate	Clay minerals	Others
1	1500 m	30	18	45	07
2	1505	42	17	34	16
3	1510	26	24	47	03
4	1515	34	21	41	04
5	1520	46	12	33	09
6	1525	52	10	34	04

Evaluate behavior of shale for given depths to understand brittleness. Give justification. What additional information is required to realize potential of this horizon?

b) What are gas hydrates? **[5]**

OR

P.T.O.

Q4) a) The following sorption isotherm data is given for a coal sample. **[10]**

P(psi)	76	122	205	221	305	504	507	756	1001	1008
V(scf/ton)	77	113.2	159.8	175	206.4	265.3	267.2	311.9	339.5	340

Calculate the Langmuir isotherm constant V_m and the Langmuir pressure constant b for the coal sample.

b) Give classification of shale given by Jarvey. **[5]**

Q5) Answer any four from the following : **[20]**

- Simplified Process Schematic for Fischer-Tropsch Coal-to-Liquids Systems.
- Basin centered gas,
- Free gas and absorbed gas in CBM,
- Hydrate types and formers,
- Different gas to liquid (GTL) processes,
- Dual porosity system.

SECTION - II

Q6) a) A gas reservoir has the following characteristics : **[10]**

$A = 2350$ acres, $h = 24$ ft, $\phi = 0.18$, $S_{wi} = 22\%$ $T = 130^\circ\text{F}$, $p_i = 2400$ psi, $Z_i = 0.82$

p	Z
2400	0.82
1200	0.88
600	0.92

Calculate the cumulative gas production and recovery factor at 1000 and 400 psi.

b) Write a note on radioactive minerals in Shale. **[5]**

OR

Q7) Write a detailed note on problems related to hydraulic fracturing operations in shale gas development. **[15]**

Q8) a) Describe the CBM gas production profile with the help of neat diagram. **[10]**

b) An undersaturated coal system has the following reservoir parameters : **[5]**
 Drainage area = 200 acres, thickness = 25 ft, porosity = 3% Initial pressure = 750 psia, desorption pressure = 520 psia, total compressibility = $16 \times 10^{-5} \text{ psi}^{-1}$.

Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption pressure.

OR

Q9) Write in brief about decline curves in unconventional reservoirs. **[15]**

Q10) Write notes on any four of the following : **[20]**

- a) Management of produced water
- b) Relative permeability curves
- c) Physical properties of hydrates,
- d) Prevention and control methods in gas hydrate formation
- e) Cambay shale as resource of shale gas
- f) CBM potential in India.



Total No. of Questions : 12]

SEAT No. :

P3196

[4859]-253

[Total No. of Pages : 3

B.E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(Elective - II) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.No.1 or Q.No.2,Q.No.3 or Q.No.4,Q.No.5 or Q.No.6, from Section - I and Q.No.7 or Q.No.8,Q.No.9 or Q.No.10,Q.No.11 or Q.No.12, from Section - II*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss in detail the effects of global warming on weather pattern and social changes that are taking place. What are the primary drivers of it?[10]
- b) What is Kyoto protocol? Write it's significance? Also write barriers towards proper implementation of it. [8]

OR

- Q2)** a) How carbon credit is important for various industrial sectors and the economical development of different Nation's? Explain with a case study. [12]
- b) What is afforestation and reforestation? Write few examples or activities than can help to earn carbon credit and will be useful to improve quality of bio-physical environment on earth [6]

- Q3)** a) Write the names of various green house gases. Discuss the impact of emission of gases from various Industrial sectors on the environment and life on the earth. [8]
- b) Discuss in detail the arrangement under Kyoto Protocol to allow industrialized countries with a green house gas reduction commitment for investment in developing countries as an alternative. [8]

P.T.O.

OR

Q4) List the operations of upstream and downstream sector that are responsible for carbon emission. Also explain, role of transport sector in carbon emission?[16]

- Q5)** a) Explain in brief CO_2 storage, transportation and its limitations in brief.[6]
b) Explain, 'emission estimation', using one example. [10]

OR

- Q6)** a) Discuss any one case study of carbon sequestration. Include, objectives, data available, challenges and methodology adopted. [10]
b) Write the advantages and limitations of carbon sequestration in deep geological formations. [6]

SECTION - II

- Q7)** a) Classify different sources of energy? [4]
b) Write a note on, 'green technology'. [6]
c) List various methods of renewable energy generation that are available today on, commercial basis and explain any one in detail. [8]

OR

Q8) What is sustainable development? Describe in detail, important factors to be considered for, 'sustainable development', also write, general methodology and steps to achieve sustainable development. [18]

- Q9)** a) Differentiate between biogas, biofuel and solid biomass. [6]
b) Explain the systematic process of, 'bio-gas generation' and write its advantages and limitations. [10]

OR

Q10) Discuss in detail various methods and sources of energy and chemicals from biomass. Write their general advantages and limitations in manufacturing.[16]

- Q11)** a) Discuss any one case study as an example of, application of carbon credit generation in oil and gas Industry, in brief. [8]
b) Write in general methods of energy saving in different areas of application.[8]

OR

Q12) Write short notes on :

[16]

- a) cleaner fuels and refining processes.
- b) importance of safety practices in carbon management.
- c) cleaner alternative sources of energy.
- d) use of standards in emission reduction.

RRRR

Total No. of Questions : 4]

SEAT No. :

P3197

[4859] - 254

[Total No. of Pages : 4

B.E. (Petroleum Engineering) (Semester - II)
IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Questions No 2 (two) and 8 (eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer 3 questions from Section I and 3 questions from Section II*
- 5) *Neat diagrams should be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain what is meant by Lax Equivalence Theorem? How is it related to reservoir simulation practice? [6]
- b) Explain how reservoir simulation can be used as a reservoir management tool. [10]

- Q2)** a) What do you mean by implicit and explicit methods? Explain in detail. Discretize the following equation given below, using 1 of the above defined explicit and 1 implicit scheme [10]

$$\frac{\partial u}{\partial t} - \alpha \frac{\partial^2 u}{\partial x^2} = 0$$

- b) Write the 1-D horizontal general fluid flow equation for oil, water and gas (both undersaturated as well as saturated) [8]
- Q3)** a) Explain what do you mean by Stability, Convergence and Consistency? How are they related to each other? [6]
- b) Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes, u_1 to u_4 , with both these being boundary nodes. Boundary conditions are provided for these nodes: [10]

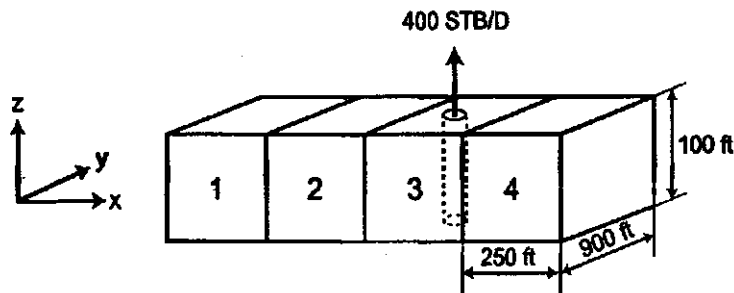
$$\frac{\partial^2 u}{\partial x^2} - 2u = 0 \text{ Where } 0 < x < 1 \text{ and } f(x) = 4x^2 - 2x - 4$$

P.T.O.

Boundary Conditions are:

$$u_1 = 0 @ x = 0 \text{ and } u_4 = -1 @ x = 1$$

- Q4) a)** A well produces @ 300 STB/D. Dimensions of the block are - $\Delta x = 150$ ft; $w = 700$ h = 100 ft; $k_x = 170$ md. Fvf 1.0 rb/stb; viscosity = 3 cp. Write the flow equation for block 3, as shown in the figure below: [8]



- b) Explain how various discretizing techniques can be derived from Taylor's series. [8]

SECTION - II

- Q5)** Explain in detail, the screening criteria for Enhanced Oil Recovery. [16]

- Q6)** What do you mean by In-situ Combustion? Draw an appropriate diagram, and explain all the zones in this method. [16]

- Q7)** Explain waterflooding models with their assumptions. [16]

- Q8)** Write short notes on (any three) : [18]

- Impact of wettability on EOR
- ASP flooding
- Fractional flow theory
- Buckley Leveret Model

Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2}(Z_{i+1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_{i+1} - p_i) - \gamma_{i-1/2}(Z_{i+1} - Z_i)]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_b}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j,k}^n \right],$$

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j}^n \right]$$

$$\int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i+1/2},k} = \left(\beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i+1/2},k} = \left(\beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2},k} = G_{x_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2},k}$$

$$T_{y_{i+1/2},k} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i+1/2},k} = \left(\beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i+1/2},k} = G_{y_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i+1/2},k}$$

$$T_{z_{i+1/2},k} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i+1/2},k} = \left(\beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{z_{i+1/2},k} = G_{z_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{z_{i+1/2},k}$$



Total No. of Questions : 12]

SEAT No. :

P3198

[4859]-255

[Total No. of Pages : 3

B.E. (Petroleum) (Semester - II)
PETROLEUM PRODUCTION ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. No. 1 or Q. No.2, Q. No.3 or Q. No.4, Q. No. 5 or Q. No.6, from Section-I and Q. No.7 or Q. No.8, Q. No.9 or Q. No. 10, Q. No. 11 or Q. No. 12 from Section-II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables. Slide rule. Mollier charts. electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data. if necessary.*

SECTION - I

- Q1)** a) Draw neat schematic sketch of a horizontal, two-phase and three phase separator and describe its design considerations for an offshore oilfield operation. **[14]**
- b) Write advantages and limitations of horizontal separators over vertical separators. **[4]**

OR

- Q2)** a) Draw neat schematic sketch of a vertical, two-phase separator and write the step by step design procedure for it. **[12]**
- b) Draw neat schematic sketches of necessary instrumentation and process control features that may be required for any one kind of separator. **[6]**
- Q3)** a) Discuss working of a Group Gathering Station (GGS) in brief **[10]**
- b) Draw neat schematic sketch of a horizontal heater treater and discuss, any one important feature of it. **[6]**

P.T.O.

OR

Q4) Write short notes on : **[16]**

- a) skimmer tanks
- b) produced water treating system
- c) safety at surface production facility
- d) storage facility for hydrocarbons

Q5) a) Write the role of any four factors that contribute to corrosion process. **[8]**

- b) Write a note on : **[8]**
- i) Cathodic protection.
 - ii) Material selection for corrosive environment

OR

Q6) a) Write various categories of scale and discuss the method of their removal in brief. **[8]**

b) Describe corrosion mechanism and write general. 'causes of corrosion'. **[8]**

SECTION - II

Q7) a) What is formation damage? How do you recognize it? Discuss diagnosis and reasons of formation damage. in brief. **[10]**

b) What is paraffin deposition inside a production tubing of a wellbore? Write the solution for it in brief. **[8]**

OR

Q8) a) Write the general reasons for decline in oil and or gas production from a wellbore and a reservoir. **[10]**

b) What is problem well analysis? Explain it with one example. **[8]**

Q9) a) Draw neat schematic sketch of a petroleum production facility and write inflow and outflow equations applicable at well head and bottom hole. **[8]**

b) Explain causes and consequences of sand production in wells. **[8]**

OR

Q10) What is sand control? Write the general design considerations for sand control job and explain any one method of sand control in detail along with neat schematic diagram. [16]

Q11) Write short notes on : [16]

- a) down hole separation and processing.
- b) advantages of horizontal wells.
- c) subsea production facility.
- d) well completion.

OR

Q12) a) What is heavy oil? What are the challenges in heavy oil production? Discuss in brief any one method of method of heavy oil recovery. [8]
b) Draw neat diagram of a typical intelligent well completion and write its applications in brief. [8]

❧❧❧

Total No. of Questions : 6]

SEAT No. :

P3552

[4859]-256

[Total No. of Pages : 1

B.E. (Petroleum Engineering)
ADVANCE DRILLING ENGINEERING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Discuss derrick design considerations in detail. [9]
b) Explain effect of buckling, radial, tangential and axial stresses on casing in brief. [9]
- Q2)** Write short note on : [16]
a) Cut off practices of drilling line.
b) Casing wear
c) Corrosion mechanism
- Q3)** a) Discuss casing inspection log USIT and IBC. [8]
b) Explain gas well cementation in detail. [8]

SECTION - II

- Q4)** Explain Mohr's coulomb criteria for 2D-3D system in detail. [16]
- Q5)** a) Discuss Managed pressure drilling in detail. [8]
b) Write short note on under balance drilling. [8]
- Q6)** a) Discuss horizontal well completion techniques in detail. [9]
b) Discuss completion problems affecting well planning. [9]



Total No. of Questions : 6]

SEAT No. :

P3199

[4859]-257

[Total No. of Pages : 1

B.E. (Petroleum Engineering) (Semester - II)

DEEP WATER TECHNOLOGY

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION - I

Q1) What is station keeping? Discuss Mooring system and DP system in detail. [18]

Q2) a) Draw Subsea well head system and discuss difference between Surface well head and subsea well head. [8]

b) Discuss Lowering process of TGB AND PGB in detail. [8]

Q3) Mohr's coulomb criteria of rock failure in detail. [16]

SECTION - II

Q4) a) Discuss different considerations for platform design. [8]

b) What are different type of offshore rigs? Explain any one in detail. [8]

Q5) Discuss enhance oil techniques in detail. [18]

Q6) a) What are different types of vessels? Discuss uses in brief. [8]

b) Describe 3 phase separator working principle and design in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P3200

[4859]-258

[Total No. of Pages : 3

B.E. (Petroleum Engineering) (Semester - II)

TRANSPORT OF OIL AND GAS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt three questions from each section.*
- 2) *Answers to the two sections must be written in separate answer book.*
- 3) *Figures to the right indicates full marks.*
- 4) *Neat diagram should be drawn wherever necessary.*
- 5) *Use a non programmable calculator.*
- 6) *Assume suitable data if necessary and clearly state it.*

SECTION - I

- Q1)** a) Explain different flow maps and discuss about importance of studying various flow patterns? [9]
- b) Explain in detail about : [9]
- i) Use of fluid properties in oil and gas transportation.
 - ii) Multiphase flow challenges in piping design.

OR

- Q2)** Write in brief about : [18]
- a) Hoop Stress vs. Equivalent Stress Criteria
 - b) Fatigue Assessment based on S-N Curves
 - c) Ratcheting

- Q3)** Late in the field life it is desirable to compress the 100 MMscfd for the example field downstream of the separator from 800 psig at 100°F to 1,000 psig. An engine-driven separable compressor is available from surplus. The engine is rated for 1,600 hp at 900 rpm. Horsepower is proportional to speed. The compressor frame has six 7-in. bore by 6.0-in. stroke double-acting cylinders with a minimum clearance of 17.92%, a rod load limit of 25,000 Ib, and rod diameter of 1.75 in. Assume $k = 1.26$ $Z_s = 0.88$, and $Z_d = 0.85$. Compute discharge temperature, volumetric efficiency, required clearance, rod load, and required horsepower for the given conditions. Also calculate the lowest suction pressure at which this unit can compress 100 MMscfd. [16]

P.T.O.

OR

- Q4)** a) Write about Wall Thickness and Length Design for Buckle Arrestors. [8]
b) Explain Equivalent Stress Criterion for pipelines in detail. [8]

Q5) Short note on (any four) : [16]

- a) Subsea system engineering
- b) Selecting Pipeline Sizes
- c) Head loss in valves and pipe fittings
- d) Standards and requirement for wall thickness criteria
- e) Pipe Capacity under Single Load

OR

Q6) Gas flows to dehydrator, which operates at 1200 psi. Line is rated for 1480 psi. Choose a line size and wall thickness using B 31.3 and B 31.8.

Data given : $Z = 0.67$ $V_{max} = 50$ ft/s, $V_{min} = 10-15$ ft/s Pressure drop = 900-800 = 100 psi. Gas Flow rate = 23 MMscfd, Viscosity = 3 cp, Gas Gravity = 0.85, Length = 12000 ft, $E = 0.95$ $\rho_m = 6.93$ lb/cu ft. For 8" $F = 0.72$, $E = 1$, $T = 1$, $S = 35,000$. For 6" $F = 0.6$, $E = 1$, $T = 1$ $S = 25,000$. For 4" $F = 0.4$, $E = 1$, $T = 1$, $S = 20,000$. [16]

SECTION - II

- Q7)** a) Explain with help of process flow diagram Gas to urea process. [8]
b) Write about (any two) : [8]
i) Gas hydrate problem
ii) Pipeline simulator
iii) Line size optimization

OR

- Q8)** a) Explain selection criteria for pumps. [8]
b) Explain with help of a diagram gas to power process. [8]

Q9) Write about various codes and standards use in oil and gas piping. [16]

OR

Q10) Explain how to decide thickness of oil and gas pipeline [16]

Q11)a) Discuss Metal Loss Inspection Techniques for subsea pipeline and onshore piping. [9]

b) Explain various pigging operation in detail. [9]

OR

Q12) Short notes on: [18]

a) Cross country pipeline

b) Power piping

c) FLNG



Total No. of Questions : 10]

SEAT No. :

P3201

[4859]-259

[Total No. of Pages : 3

B.E. (Petroleum Engineering) (Semester - II)
ENVIRONMENTAL TECHNOLOGY AND SAFETY IN
PETROLEUM INDUSTRY
(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt three questions from each section.*
- 2) *Que No. 5 and Que No. 10 are compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams should be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use a non programmable calculator.*
- 7) *Assume suitable data if, necessary.*

SECTION - I

- Q1)** a) Why is it necessary to conduct the "Environment Impact and Risk Assessment" study before starting of any Petroleum field related operations? How Environmental Impact and Risk Assessment (EIRA) are done? [6]
- b) Explain in detail environmental impact of gas flaring? What measures are to be taken to reduce its environmental impact? [6]
- c) What are the allowable limits for disposal of wastewater on to the land, in to sea and river as per the IS standards? [4]

OR

- Q2)** a) Discuss one case study for HAZOP analysis of any process. [6]
- b) How pollution creates effects in overall Ecosystem? Discuss it with help of examples. [6]
- c) What do you mean by NORM? How NORM is produced? What precautions must be taken to treat NORM? [4]
- Q3)** a) How production discharge in the onshore and offshore areas creates impacts on to environment? [6]
- b) What are physical principles used in following equipment Plate condensers, Gas/Air filtration units, hydro cyclones, skim pipes. [4]

P.T.O.

- c) How produced water is treated treatment? Draw a simple flow sheet for treatment method. [6]

OR

- Q4)** a) What are the different chemicals used in bulk in drilling muds. How do they affect the environment? What are the methods of limiting their impact on environment? [6]
- b) What are the Safety precautions needed while working in H₂S environment? What will happen if such a care is not taken. [4]
- c) Write short notes on impact of crude oil on marine animals, ecosystems, human health, on plant growth? [6]
- Q5)** a) Discuss in details about subsurface disposal of petroleum industry for liquids and solids. [6]
- b) What is the process implemented for site assessment for remediation of contaminated site? [6]
- c) Write short notes on neutralization of petroleum industry waste? [6]

SECTION - II

- Q6)** a) How Root Cause Analysis is conducted? What is advantage of conducting RCA? [8]
- b) Discuss the procedures for onshore/offshore well abandonment. [8]

OR

- Q7)** a) Discuss the importance of Work Permit system. [8]
- b) Discuss in details about the importance of standards like OHSAS 18001 and ISO 14000 for environmental management. [8]

- Q8)** a) Discuss the environmental aspects of oil field operations with respect to drilling and offshore operations. [6]
- b) Write merits and demerits of FMEA, what-if analysis. [4]
- c) What are effects of emulsification on the oil spills? [6]

OR

- Q9)** a) Discuss various safety aspects during drilling, logging, production, transportation, handling etc at onshore and offshore sites. [10]
- b) What do you mean by Emergency Response Plan (ERP) and what are regulatory requirement for ERP? [6]

Q10) Write short note on following (Any Five) :

[18]

- a) Decommissioning of offshore structures
- b) BOD and COD
- c) Sludge Volume Index
- d) Stop cards
- e) Pollution caused by lack of well integrity
- f) Emissions from refinery



Total No. of Questions : 12]

SEAT No. :

P1691

[4859]-26

[Total No. of Pages :4

B.E. CIVIL

c-HYDROPOWER ENGINEERING

(2008 Pattern) (Semester-II)(401008) (Open Elective)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat and labeled diagrams wherever necessary.*

SECTION-I

Q1) a) Explain concept process advantages, limitations of **[8]**

- i) Nuclear power and
- ii) Tidal power.

b) Which are the six major hydropower potential river systems exist in India? State the examples of significant hydropower stations established these systems. **[8]**

OR

Q2) a) Explain the process of advantages and limitations of **[8]**

- i) Thermal power
- ii) Wind power.

b) Explain process of Nuclear power generation 1 Why Nuclear power is considered as positive power source of future? **[8]**

Q3) a) Explain the classification of hydropower plant based on

- i) function
- ii) Plant capacity
- iii) Head
- iv) Location .

[8]

P.T.O.

- b) What are components of pumped storage plants and its classification based on inflow and reservoir capacity. [8]

OR

Q4) a) What is storage or valley dam plant ? Draw its layout and explain the component of storage power plant with its function. [8]

- b) Differentiate between base load and peak load plant. [8]

Q5) a) Explain the load duration curve on the basis of [8]

- i) Concept
- ii) Significance
- iii) Application
- iv) Graph.

b) The load on hydal plant varies from a min of 10,000 kW to maximum of 35000 kW each have been installed calculate. [10]

- i) Total installed capacity of the plant.
- ii) Plant factor.
- iii) Maximum demand.
- iv) Load factor.
- v) Utilisation factor.

OR

Q6) a) What is load predicted and its significance? What are different methods of load prediction? State any two mathematical equation of load prediction. [8]

b) A river has a constant flow of 40 cumecs with the head of 15m considering overall efficiency of 80% determine. [10]

- i) Firm capacity of run of river plant for 8 hrs without pondage.
- ii) Pondage factor.
- iii) Firm capacity of plant with pondage.
- iv) Volume of pondage.

SECTION-II

- Q7)** a) What is meant by instrumentation of powerhouse . [8]
b) Differentiate between surface power house and underground power house. [8]

OR

- Q8)** a) Describe any four powerplant equipments and their functions. [8]
b) With a neat layout explain components, their function and working of dam toe power house which type of turbine is preferred in dam toe power house and why? [8]
- Q9)** a) Derive the equation for height of draft tube so as to install reaction turbine at appropriate working of pressure. [8]
b) A penstock supply water from a dam to pelton wheel with gross head of 900 m and $\frac{1}{3}$ rd of it is lost in friction. The $Q=4 \text{ m}^3/\text{sec}$ and is deflected through 165° . Find horse power of runner and hydraulic efficiency. Take $C_u=0.48$ $C_v=0.98$.
Assume smooth plate without any shock. [8]

OR

- Q10)**a) Differentiate between reaction turbine and Impulse turbine. [8]
b) A pelton wheel is to be designed for the following specifications. Shaft power 11772 kW, Head=380 m Speed 750 rpm, Overall efficiency=86%. Jet dia is not to exceed one sixth of wheel diameter Determine
i) Wheel diameter
ii) The no. of jets required
iii) Dia of Jet
Take $K_{v_1}=0.985$ & $K_{u_1}=0.45$. [8]

Q11)a) What is pricing of electricity? State any four factor Governing pricing of electricity. [9]

b) What are the functions of state load dispatch centre. [9]

OR

Q12)a) Explain the participation of private sector in economics of Hydroelectric power. [9]

b) Explain concept of carbon credit. Justify hydropower as green power. [9]



Total No. of Questions : 6]

SEAT No. :

P3202

[4859]-260

[Total No. of Pages : 4

B.E. (Petroleum) (Semester - II)

PETROLEUM ECONOMICS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

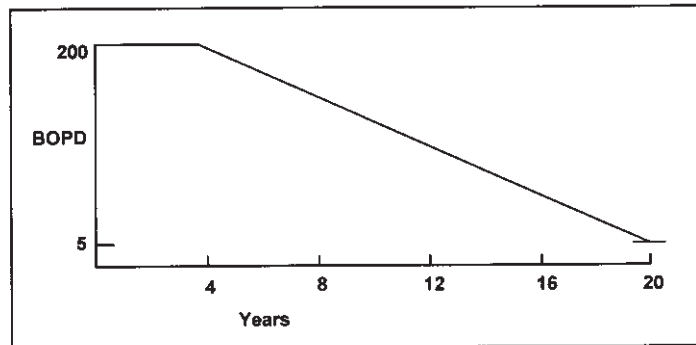
- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve any two questions each from section I and II.*
- 3) *Use of graph paper is allowed.*
- 4) *Figures to the right indicate marks.*
- 5) *Assume additional Data if necessary.*

SECTION - I

- Q1) a)** Write notes on any two of the following: **[16]**
- i) Decline curves in the calculation of reserves of hydrocarbons.
 - ii) Errors in the calculation of reserves.
 - iii) Hubert curve.
- b) Write a note on production and demand of hydrocarbons in India. **[9]**
- Q2) a)** Current oil price in international market is \$ 80.25. It is anticipated that the price will increase at a rate of general inflation, which is forecast to be at the rate of 6.30 % per year for first three years and then drop to an annual rate of 4.75 % thereafter. The producible in the block has lower API than that brand oil along with higher sulphar and TAN content, thus leading to a price differential of 10.25 % with respect to the oil price quoted above. Develop a forecast for oil price for brand oil and the oil under consideration for a span of eight years. **[10]**
- b) Operating costs are estimated to be \$ 200,000 per year. which will remain constant during the life span of a project. i.e. 10 years. A capital investment of \$ 1 MM is anticipated for year one and an additional investment of \$ 100,000 in seventh year. Inflation is forecast to be 7 % for first half of the project and then drop to 6 % for the remaining period. Prepare a cash flow diagram and calculate the PV of the cash flow. **[15]**

P.T.O.

- Q3) a)** Figure given below shows that the well has produced at a constant rate of 200 BOPD for 4 years. The production then declined exponentially over the next 16 years to an economic limit of 5 BOPD. The company demands a minimum ROR of 10 % and oil from this field is \$ 3.15/ bbl. net after local taxes, royalty and operating expenses. Calculate a composite NPV of a barrel of oil using annual compounding. Assume that NPV of decline production, as of start of decline. is \$ 4,50,000.00. [15]



- b) Explain in brief Resource classification system recommended by SPE.[10]

SECTION - II

- Q4) a)** A choice must be made between three alternatives: to drill, drop acreage and farm out on an expiring lease. Following conditions exist: [15]

Sr. No	Description	Value
1	Discovery	30 %
2	Dry hole cost	\$750,000
3	Completion cost	\$ 500,000
4	Surface facilities	\$ 50,000
5	Lease cost	\$ 200,000

If this lease is dropped, a tax credit of \$ 50,000 is available.

Farm out is available on 25% WI with the condition that the farmer will pay a maximum of \$ 125,000 for surface facilities.

Two situations are possible in case of discovery :

Description	Probability	Value
Commercial well	0.8	\$10 MM
Marginal well	0.2	\$3 MM

This is excluding drilling, completion and facilities.

Construct a suitable decision tree and give decision on maximizing EMV with proper justification.

b) Write a detailed account on Petroleum Accounting system. [10]

Q5) a) Initial cost of the completely installed reactor is \$ 90,000 and its salvage value towards is \$ 12,000. Service life of the reactor is 6 years. Calculate its depreciation using Straight Line (SLD), Declining Balance (DBD) and Double Declining Balance (DDB) methods. Prepare a plot of book value against number of years and compare the results obtained with different methods. [15]

b) Write notes on any two of the following : [10]

- i) Profitability in projects and equivalence of field size in different countries within the framework of Production Fiscal System.
- ii) Risk analysis applied to Petroleum field development.
- iii) Variation in technical costs of exploration and production of oil and gas as a function of water depth and geographic location

Q6) a) Details of production profile and expenditure required are given in the following table for a field under consideration for procurement [20]

Year	Production in million barrels	Year	Production in million barrels
1	7.85	11	13.23
2	14.86	12	10.56
3	20.63	13	8.47
4	20.71	14	4.10
5	20.78	15	3.53
6	20.87	16	3.05
7	20.96	17	2.63
8	21.07	18	2.28
9	21.18	19	1.98
10	16.69	20	1.72

Prepare a tabular form of the data giving details of annual production, cumulative production, gross cash flow, royalty, net cash flow BFIT and AFIT, government share and contractor share, NPV for contractor BFIT and AFIT.

Following are the assumptions for the preparation of spreadsheet and further calculations :

- i) Oil price is uniform at \$ 60 per barrel
- ii) Royalty is 10% of annual revenue/annual production.
- iii) Time value of money is 8%.
- iv) Cost recovery is 70% and remaining cost is allowed to carry forward
- v) Profit petroleum is shared between government and contractor at 60: 40 proportions respectively.
- vi) Income tax is 30%.

Calculate the contractors NPV before tax and after tax. How much is the profit for contractor in one barrel and what is the total revenue generation for government in the calculation of one barrel?

- b) An oil company has mapped a prospect and concluded that the resources may be as high as 50 million barrels and the probability of success (POS) is estimated to be 10%. The data acquired, the interpretations and the cost of the exploration well will amount to 20 million USD. If a discovery is made, the NPV will be 90 million USD. Calculate the expected monetary value. Find the breakeven POS [5]



Total No. of Questions : 8]

SEAT No. :

P3203

[4859]-261

[Total No. of Pages : 2

B.E. (Petroleum Engineering)
PETROLEUM PRODUCTION ENHANCEMENT AND
OPTIMIZATION
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II*
- 3) *Figures to the right indicate full marks.*
- 4) *Q 2 (two) and Q 6 (six) are compulsory.*
- 5) *Neat diagrams should be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What is the purpose of stimulation? Explain in detail. [6]
b) Write the primary reactions involved in matrix acidization job for sandstone and carbonate formations. Explain dissolving power of an acid and also give typical formulations of acidic system and their concentrations for the above mentioned two formations. [10]
- Q2)** a) How is a fracturing treatment design done? Explain in detail. [10]
b) Write a short note on: [8]
i) Step-up and Step-down test
ii) Post fracturing pressure matching
- Q3)** a) State and explain the equations to calculate the surface pressure required in fracturing and acidization jobs. [10]
b) Write a short note and explain about well conditioning and clean-up before and after a stimulation job [6]

P.T.O.

- Q4) a)** What do you mean by production enhancement, and what are its various methods? Explain any one in brief. [10]
- b) What types of fracture models are used? Explain one. [6]

SECTION - II

- Q5) a)** Describe in brief, various techniques to boost oil production from a given reservoir under normal operating conditions. [8]
- b) What are the different methods to unload a liquid loaded gas well? Explain the flow regimes and plunger lift mechanism used in it. [8]
- Q6)** What do you mean by optimization? In general why it is necessary to go for optimization in Petroleum Production related processes or equipments? List, at least six general situations in which you may need to go for production optimization. [18]
- Q7) a)** What is production optimization? Explain various methods of production optimization for self-flowing well. [10]
- b) What is the function of a production choke? Draw a generic graph and indicate the operating point for typical tubing and choke size on an inflow performance curve. Explain the basis for selection of tubing and choke size from the point of optimization [6]
- Q8) a)** Write the various techniques or tools that are available to improve the production performance of a field. Explain any one of them along with application of it. [8]
- b) What is real time monitoring ? Write the benefits of real time monitoring of surface and subsurface production system in oil and gas field. How it is useful in the diagnosis of system performance ? Explain in brief. [8]



Total No. of Questions : 6]

SEAT No. :

P3204

[4859]-262

[Total No. of Pages : 1

B.E. (Petroleum Engineering) (Semester - II)

WELL CONTROL METHODS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What is primary well control. secondary well control and tertiary well control? [6]
b) Drill pipe capacity 0.0176 bbl/ft, Drill pipe metal displacement = 0.0082 bbl/ft. Average length of one stand = 93ft.
Calculate :
Mud required to fill the hole to pull 5 stands of drill pipe dry and 10 stands of drill pipe wet. [6]
c) What are different reasons to generate abnormal pressure in formation?[6]
- Q2)** a) Discuss soft shut in and hard shut in with illustrative figure. [8]
b) Explain Leak off test in detail. What is MAASP? [8]
- Q3)** a) Discuss close well and open well gas migration in detail. [10]
b) Define - Trip margin and Ballooning effect [6]

SECTION - II

- Q4)** a) Discuss wait and weight method in detail. [8]
b) Explain volumetric method in detail. [8]
- Q5)** a) Describe unusual problems encounter in well control situations. [9]
b) Discuss stripping operation in detail. [9]
- Q6)** a) Draw subsea BOP stack [8]
b) Discuss underground Blow out and Relief well operation in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1818

[4859]-263

[Total No. of Pages : 3

B.E. (Chemical)

PROCESS DYNAMICS & CONTROL

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q8, Q9 or Q.10, Q.11 or Q.12 from section II.
- 2) Answer to the two sections should be written in separate answer books.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data, if necessary.
- 5) Neat diagrams must be drawn wherever necessary.

SECTION-I

Q1) Develop the complete mathematical model of a single liquid level tank system assuming nonlinear relation between the outlet flowrate 'F' and the liquid level 'h'. Linearize the nonlinear term around h_0 and find the transfer function of the system relating the liquid level 'h' to the inlet flowrate F_1 . **[16]**

OR

Q2) Develop the complete mathematical model equations of an isothermal CSTR starting from basic laws, for a first-order reaction: $A \rightarrow B$. List all the variables involved and state the assumptions made. Also find the transfer function between the outlet and inlet concentration of component 'A'. **[16]**

Q3) a) For a second order system with following transfer function **[8]**

$$G(s) = \frac{7}{(25s^2 + 2s + 1)}$$

When a step change of magnitude 5 is introduced into the system find

- i) Rise time
 - ii) Ultimate value of response
 - iii) Decay ratio
 - iv) Overshoot
- b) Write the time and the Laplace transfer function equations of a PID controller and give the advantages and disadvantages of each P,I and D actions. **[8]**

OR

P.T.O.

Q4) A standard first-order process is controlled by a PD-controller. Determine the following, assuming $G_m = G_f = 1$ [16]

- i) Overall closed-loop transfer function
- ii) Order of the closed-loop system
- iii) Offset equation for a unit step input in $Y_{sp}(s)$
- iv) Overall gain of the closed-loop system.

Q5) Draw the root locus of the system with the following transfer function, [18]

$$G(s) = \frac{82K_c}{(s+1)(s+3)}$$

Show all the steps in detail and comment on the stability of the system.

OR

Q6) a) Check the stability of a closed loop feedback control system with a P-controller with the following transfer function, $G_p(s) = \frac{(s+5)}{(s+1)(s+3)}$. [9]

Assume $G_m(s) = G_f(s) = 1$

b) What is process reaction curve? Explain how it is used for tuning a control system. [9]

SECTION-II

Q7) Explain the Bode plots of a standard first-order and second-order systems with appropriate nature of graphs. [16]

OR

Q8) Draw the Nyquist diagram for the system, $G(s) = \frac{1}{(2s+1)}$ [16]

Show the steps in detail and comment on the stability of the system based on the Nyquist stability criteria.

- Q9) a)** Explain feed-forward control system with a suitable example. [8]
- b) Discuss the override control scheme of steam boiler for steam rate control with the process diagram and basic block diagram. [8]

OR

- Q10) a)** What is inferential control? Explain with a block diagram for distillation process control. [8]
- b) Describe relative advantages and disadvantages of feedforward and feedbackward control systems [8]

- Q11) a)** Describe the programming procedure of PLCs through a simple ladder diagram [9]
- b) Write a short note on SCADA control system. [9]

OR

- Q12) a)** Explain the process of conversion of analog signals to digital signals. [9]
- b) Describe the plantwide control scheme for a plant with compressors. [9]



Total No. of Questions : 12]

SEAT No. :

P1819

[4859]-264

[Total No. of Pages : 3

B.E. (Chemical)

**CHEMICAL REACTION ENGINEERING-II
(2008 Course) (Semester-I) (409344)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the selection of model for non-catalytic reaction of particles. **[8]**
- b) A feed consisting of 30% of 50 μ radius particles 40% of 100 μ radius particles and 30% of 200 μ radius particles is to be treated in a fluidized bed steady state how reactor constructed from 4 ft. length of 4 in-pipe. The fluidizing gas in the gas phase reactant and at the planned operating conditions the time required for complete conversion is 5, 10 and 20 min. for the three sizes of feed. Find conversion of solid in the reactor for feed rate of 1 kg solid/min. If the bed contains 10 kg solid. **[10]**

OR

- Q2)** a) Derive an expression for time and conversion for ash film control of spherical particle of unchanging in size during the reaction. **[9]**
- b) Explain the unreacted core model for spherical particles of unchanging size. **[5]**
- c) Explain the factors affecting on the rate controlling of gas-solid reaction. **[4]**

- Q3)** a) Explain the film conversion parameter. **[8]**
- b) Explain the kinetic regimes for mass transfer and reaction in fluid-fluid reaction with neat sketches. **[8]**

OR

P.T.O.

Q4) Concentration of undesirable impurities in air at 1 bar (10^5 pa) is to be reduced from 0.1% (100 pa) to 0.02% (20 pa) by absorption in pure water. Find the height of tower required for counter current operation.

Data: $K_{Aga} = 0.32 \text{ mol/hr.m}^3 \text{ pa}$, $K_{Ala} = 0.1/\text{hr}$,
 $H_A = 12.5 \text{ pa m}^3/\text{mol.}$, $G = 1 \times 10^5 \text{ mol/hr. m}^2$
 $L = 7 \times 10^5 \text{ mol/hr. m}^2$, $C_T = 56000 \text{ mol/m}^3$. [16]

Q5) Write short notes on the following: [16]

- a) Langmuir adsorption isotherm.
- b) Pore volume distribution.

OR

Q6) Write short notes on the following: [16]

- a) BET method.
- b) Pore volume and solid density.

SECTION-II

Q7) a) Derive an expression of effectiveness factor for an isothermal first order irreversible reaction, $A \rightarrow R$ in a single cylindrical pore. [12]

b) Explain mass transfer with reaction in catalyst pellet. [6]

OR

Q8) a) Explain the diffusion in porous catalyst. [9]

b) Explain Knudsen diffusivity and surface diffusion in detail. [9]

Q9) a) Explain steps involved in solid catalysed reaction with neat diagram. [8]

b) Write note on integral and differential analysis of catalytic reactors. [8]

OR

Q10)a) Explain the experimental method for finding rates of solid-catalysed reactor. [16]

Q11) Write short notes on the following: [16]

- a) Fluidised bed reactor.
- b) Slurry reactor.

OR

Q12) Write short notes on the following: [16]

- a) Packed bed reactor.
- b) Enzyme catalysed reactor.



Total No. of Questions : 12]

SEAT No. :

P1820

[4859]-265

[Total No. of Pages : 3

B.E. (Chemical Engg.)
CHEMICAL ENGINEERING DESIGN-II
(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Explain the classification of reaction vessels. **[6]**

- b) Toluene is continuously nitrated to mononitrotoluene in a cast iron vessel, 1 m diameter, fitted with a propeller agitator 0.3 m dia, rotating at 2.5 Hz. The temperature is maintained at 310 K by circulating 0.5 kg/sec cooling water through a stainless steel coil 25 mm OD and 22 mm ID, in form of a helix, 0.8m in diameter. The reacting material is having the same physical properties as 75% sulphuric acid. If the mean water temperature is 290 K, what is the overall heat transfer coefficient for desired heat transfer?

Properties - water - Thermal conductivity = 0.59 W/m.K, $C_p = 4180$ J/kg.K, viscosity = 1.08 mN.s/m², Density = 998 kg/m³.

75% sulphuric acid - Thermal conductivity = 0.40 W/m.K, $C_p = 1880$ J/kg. K, Viscosity = 6.5 mN.s/m², Density = 1666 kg/m³, Viscosity at surface = 8.6×10^{-3} N.s/m².

Thermal conductivity of stainless steel is 15.9 W/m.K, Dirt resistance at inside and outside surfaces are 0.0002 and 0.0004 m². K/W respectively.

[12]

OR

- Q2) a)** Calculate the diameter of the shaft used in agitation system. Torque acting over the shaft is 1,15,000 kg.cm while bending moment acting over the shaft is 34,600 kg.cm. Factor of safety = 6. Ultimate tensile strength of material of shaft = 6,900 kg/cm². Ultimate shear stress is 75% of UTS. **[8]**

P.T.O.

- b) What parameters should be considered for agitator selection. [6]
 c) Write a note on classification of agitators. [4]

- Q3)** a) Find out the plate pressure drop and check the downcomer back up for the column with the help of following data: Diameter of column = 0.79 m, Area of column = 0.5m^2 , Volumetric flow rate of vapours = $1.13\text{ m}^3/\text{s}$, Orifice coefficient = 0.84, Density of vapours = 0.70 kg/m^3 , Density of liquid = 950 kg/m^3 , Weir height = 50 mm, Weir length = 0.6 m, Hole diameter = 5 mm, Plate thickness = 5 mm, Height of overflow weir = 27 mm, Maximum liquid rate = 4.06 kg/s . [10]
 b) Give advantages of plate column over packed column. [6]

OR

- Q4)** a) What are the different design methods for binary systems? Explain any one in detail. [8]
 b) Explain AICHE method for calculation of point efficiency. [8]

- Q5)** a) Explain in detail Onda's method for prediction of HTU. Give the necessary equation. [8]
 b) Explain the column internals for packed columns. [8]

OR

- Q6)** a) Give the equations for HG and HL as per Cornell's method and explain all the terms. [8]
 b) Explain the estimation of packed bed height for distillation column with all the relevant equations. [8]

SECTION-II

- Q7)** a) Design a decanter to separate a light oil from water. The oil is the dispersed phase. Oil - Flow rate = 1,000 kg/h, Density = 900 kg/m^3 , Viscosity = 3 mNs/m² Water - Flow rate = 5,000 kg/h, Density = $1,000\text{ kg/m}^3$, Viscosity = 1 mNs/m² Droplet diameter = 150 μm . [10]
 b) Explain in detail about material hazards and process hazards. [8]

OR

Q8) a) Design a separator for the separation of a mixture of steam and water. **[10]**

Steam : Flow rate = 2100 kg/h, Density = 2.2 kg/m³

Water: Flow rate = 1000 kg/h, Density = 930 kg/m³

Operating pressure = 4 bar.

b) Explain any two safety devices. **[8]**

Q9) a) What are the various types of supports used for piping? **[8]**

b) Water is to flow through a pipeline at a rate of 1 kg/sec to a distance of 1.5 kilometer. The impressed head of water is 9.8m. density of water = 1,000 kg/m³, viscosity = 1 mN s/m². What should be the diameter of the pipeline. **[8]**

OR

Q10)a) Discuss the various factors considered while designing pipeline for natural gas. **[8]**

b) 30 kg/sec of water is to be transported through a steel pipeline to a location 2 km away. The frictional pressure drop across the pipeline is 50,000 N/m². Find the diameter of the pipeline. Roughness of pipeline is 4.1×10^{-5} . Density = 995 kg/m³, viscosity of water 0.8 m N.s/m². **[8]**

Q11) a) What are the desirable properties of piping materials? **[8]**

b) Why are standards required? Name a few standards followed in piping design. **[8]**

OR

Q12)a) Explain the gaskets and their classification. **[8]**

b) Explain the materials used for low, normal, and high temperature service pipelines. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1821

[4859]-266

[Total No. of Pages :2

B.E. (Chemical)

a-ENVIRONMENTAL ENGINEERING

(2008 Course) (Elective-I) (Semester - I) (409341)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Write expressions for the following: **[8]**
- i) Relationship between ppm and volume concentration & pollutant.
 - ii) Mass-Volume concentration.
- b) State three adverse effects of population growth on the environment. **[8]**

OR

- Q2) a)** Classify air pollutants according to source type. **[5]**
- b) Give the source and harmful effects on the human health on the particulate pollution created by lead, nickel and mercury. **[5]**
 - c) Compare the conventional and high efficiency cyclones in terms of efficiency and dimensions. **[6]**
- Q3) a)** Draw a neat sketch of fabric filter and explain. **[5]**
- b) With sketch explain the working principle and equation of efficiency for electrostatic precipitator. **[5]**
 - c) Explain kyoto protocol. **[6]**

OR

P.T.O.

- Q4)** a) Draw a neat sketch of fabric filter and explain. [4]
b) Explain the spray towers and centrifugal towers with neat diagrams. [6]
c) Explain Isokinetic sampling. [6]

- Q5)** Write short notes on the following: [18]
a) Water and air pollution laws.
b) Effect of carbon monoxide on humans.

OR

- Q6)** What is Green house effect? Explain with neat figure. [18]

SECTION - II

- Q7)** Discuss how the least square method can be used to calculate the BOD constants for the waste water? Explain with the example. [16]

OR

- Q8)** a) Define and explain the significance of the following parameters in activated sludge process. [12]
i) Hydraulic retention time.
ii) Mean cell residence time.
b) Discuss how process control is carried out in activated sludge process. [4]

- Q9)** a) Explain oxygen sag curve. [8]
b) Explain primary, secondary and tertiary treatment of wastewater. [8]

OR

- Q10)** Explain trickling filter with neat diagram. [16]

- Q11)** Write short note on: [18]
a) Aerobic and anaerobic lagoons.
b) Incineration process in solid waste management.

OR

- Q12)** Write short note on: [18]
a) Composting of disposal of solid waste.
b) Ion exchange process in the tertiary treatment of wastewater.



Total No. of Questions : 12]

SEAT No. :

P1822

[4859]-267

[Total No. of Pages : 3

B.E. (Chemical)

MEMBRANE TECHNOLOGY

(2008 Course) (Elective-I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary*

SECTION-I

- Q1)** a) Classify membrane separation processes and state their advantages over conventional separation processes. [8]
- b) Explain the importance of separation operation in chemical manufacturing processes. [8]

OR

- Q2)** a) State materials used for preparation of membranes and state characteristics of each. [8]
- b) Classify membranes based on homogeneity, transport mechanism, nature of material electric charge, morphology. [8]
- Q3)** a) Explain how polymer chain flexibility depends on the characteristics of main chain elements & side group elements. [8]
- b) Explain the importance of glass transition temperature in determining state of polymer. [8]

OR

- Q4)** Explain use of following polymeric materials used for membranes. [16]
- a) Linear or branched chain polymers.
 - b) Copolymers(random,block, graft type).
 - c) Cross-linked type. **P.T.O.**

(Give suitable applications)

Q5) What are composite membranes? Explain the following methods of preparation of composite membrane- [18]

- a) Interfacial polymerization.
- b) Dip coating.
- c) Plasma polymerization

OR

Q6) Explain the following methods for preparation of membrane-. [18]

- a) Sintering.
- b) Stretching.
- c) Track etching.
- d) Template leaching.

SECTION - II

Q7) What is characterisation of process membrane? Explain following methods of characterisation of process MF membrane. [16]

- a) SEM.
- b) Bubble - point method.
- c) Mercury intrusion porometry.
- d) Permeability method.

OR

Q8) Explain the following methods of characterisation of UF membrane. [16]

- a) Gas absorption - desorption.
- b) Thermoporometry.
- c) Permporometry.
- d) Liquid displacement.

Q9)a) Distinguish between solution diffusion model and pore flowQ9)Distinguish

transport through membranes. [8]

- b) Explain the following mechanisms used to describe transport through porous membranes. [8]
- Surface of screen filtration.
 - Depth filtration.

OR

- Q10)**a) Distinguish between surface or screen filters and depth filters used as UF/ MF membranes. Explain mechanical exclusion model for surface filters and state the expression for solute rejection. [8]
- b) Explain transport in an ion exchange membrane process such as electrodialysis. [8]
- Q11)**a) Explain concentration polarization and fouling in case of membranes. Explain boundary layer film model for concentration polarization. Derive the expression for polarization modulus (m) in the form. [8]

$$M = \frac{\exp(Jv\delta/D_i)}{1 + E_0 \exp\left(\frac{Jv\delta}{D_i} + 1\right)}$$

- b) Distinguish between osmosis and R.O. Explain use of R.O. process for desalination of water. Derive the expression for salt rejection factor in the form. [10]

$$\%R = \left[1 - \frac{\rho_w B}{A(\Delta P - \Delta \Pi)} \right] \times 100$$

(symbols have their usual meaning)

OR

- Q12)** Explain the following applications of uF process. [18]
- Recovery or electrocoat paint in automobile plants.
 - Clarification of fruit juice.
 - Oil - water emulsions



Total No. of Questions : 12]

SEAT No. :

P1823

[4859]-268

[Total No. of Pages :4

B.E. (Chemical Engineering)
c-BIOPROCESS ENGINEERING (Theory)
(2008 Revised Course) (Elective-I) (Semester - I) (409341)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6,Q7 or Q.8, Q9 or Q.10 and Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicates full marks.*
- 4) *Assume suitable data if necessary.*

Q1) a) Explain specific growth rate of bacteria **[8]**

b) Discuss the concept of Bio refinery **[8]**

OR

Q2) a) Explain rate of DNA in cell life cycle. **[8]**

b) Write note on protein & their diverse application **[8]**

Q3) Explain the manufacturing process of **[16]**

a) Acetone

b) Penicillin

OR

Q4) Explain the manufacturing process of **[16]**

a) Wine

b) Vitamin A

P.T.O.

Q5) An enzyme was assayed at an initial substrate concentration of 10^{-5}M . The K_m for the substrate is $2 \times 10^{-5}\text{M}$. At the end of 1 min, 2% of the substrate has been converted to the product. [18]

- What percent of the substrate will be converted to the product at the end of 3 min? What would be the product and substrate concentrations after 3 min?
- If the initial substrate concentration were 10^{-6}M , what percent of the substrate will be converted to the product after 3 min.
- What is the maximum attainable velocity with the enzyme concentration used?
- At about what substrate concentration will V_{\max} be observed.
- At this substrate conc., what % of substrate will be converted to product?

OR

- Q6)** a) What is meant by modulation of enzyme activity? What are the different effects? [8]
- b) Derive the Michaelis menten equation for describing the enzyme kinetics? [10]

SECTION - II

- Q7)** a) Explain the ideal reactors used in kinetics of substrate utilization? [8]
- b) What are other environmental effects on growth of microbial biomass? Discuss each factor in detail. [10]

OR

- Q8)** a) The specific growth rate for inhibited growth in chemostat is given by the following equation. [8]

$$\mu_s = (\mu_m s) / (k_s + s + IK_s / k_1)$$

where $S_0 = 10\text{g/l}$ $K_s = 1\text{g/l}$ $I = 0.05\text{g/l}$ $Y_{x/s}^m = 0.1 \text{ g cells/g sub}$

$X_0 = 0$ $K_1 = 0.01 \text{ g/l}$ $\mu_m = 0.5\text{h}^{-1}$ $K_d = 0$

- Determine X & S as function of D when $I = 0$
- With inhibitors added to a chemostate determine influent substrate concentration & X as function of D .
- Determine the cell productivity. Dx as function of dilution rate.

b) A simple batch fermentation of an aerobic bacterium growing on methanol gave the result as shown in table. Calculate. [8]

- i) Plot time v/s x graph.
- ii) Yield of substrate (Y)
- iii) Net specific growth rate.
- iv) Cal. Maximum cell conc. One would expect if 150g of substrate is used?

Time(h)	X(g/l)	S(g/l)
0	0.2	9.23
2	0.211	9.21
4	0.305	9.07
8	0.98	8.03
10	1.77	6.8
12	3.2	4.6
14	5.6	0.92
16	6.15	0.077
18	6.2	0

c) Give the medical application of Enzyme [2]

Q9) a) How oxygen transfer rates are determined and explain measurement of $K_L a'$ using gas liquid reactions? [8]

b) Explain immobilized biocatalyst with suitable example and its applications? [8]

OR

Q10)a) Explain practical operating boundaries for aerated and agitated fermentors with the help of figure. [8]

b) Compare between physical and chemical methods of enzyme immobilization. State advantages and disadvantages of both? [8]

Q11)a) Explain the importance of bioprocess economics? [8]

b) Explain various chromatography techniques used in bioprocess? [8]

OR

Q12) Write note on. [16]

i) Reverse osmosis

ii) Ultrafiltration

iii) Fluidized bed bioreactor

iv) Electrodialysis



Total No. of Questions : 12]

SEAT No. :

P3636

[Total No. of Pages : 2

[4859]-269

B.E. (Chemical)

CORROSION ENGINEERING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any THREE questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the importance of design and material selection in controlling corrosion. [8]

b) State the conditions for electrochemical corrosion to occur. [8]

OR

Q2) a) Explain thermodynamic aspects of corrosion. [8]

b) Distinguish between wet and dry corrosion. [8]

Q3) a) What is cathodic protection? Under what conditions is this protection more useful? [8]

b) What are the differences between EMF and Galvanic Series? [8]

OR

Q4) a) Discuss activation and resistance polarizations. [8]

b) Explain Pourbaix-diagram for Fe -H₂O system. [8]

Q5) a) Discuss the mechanism of chemical and electrochemical corrosion. [9]

b) Explain Galvanic corrosion and pitting corrosion. [9]

OR

P.T.O.

- Q6)** a) Explain intergranular and stress corrosion cracking. [9]
b) What are the remedial measures for preventing galvanic corrosion and pitting corrosion. [9]

SECTION - II

- Q7)** a) What are the important constituents of paint? Explain the function of each. [8]
b) Discuss the effect of velocity, temperature and composition of media on corrosion of iron and steel. [8]

OR

- Q8)** a) How is pilling Bedworth ratio related to the protective capacity of an oxide layer? [8]
b) Discuss how the nature of the metal influences the rate of corrosion. [8]

- Q9)** a) What are the limitations of electro plating? [8]
b) Why does any impure metal corrode faster than pure metal under identical conditions? [8]

OR

- Q10)** a) What are the drawbacks of cathodic protection? [8]
b) What are corrosion inhibitors? Classify different types of inhibitors with examples. [8]

- Q11)** a) What is a sacrificial anode? How does it protect a submerged pipeline? [9]
b) What are the factors that affect electroplating? [9]

OR

- Q12)** a) Write a note on Nernst equation. [8]
b) Explain chemical and mechanical methods of surface treatment. [10]



Total No. of Questions : 12]

SEAT No. :

P3205

[Total No. of Pages : 2

[4859] - 270

B.E. (Chemical) (Semester - I)

CHEMICAL PROCESS SYNTHESIS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 03 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What are the different considerations for the development of a chemical process? [8]
b) Mention different types of reactions systems and discuss any two with example. [8]

OR

- Q2)** a) Explain in short the hierarchy of process design and onion model. [8]
b) Write a short note on-overall process design. [8]

- Q3)** a) What are the important parameters in choice of reactors? Explain any two in detail. [8]
b) Write short note on - Idealized reactor model. [8]

OR

- Q4)** a) What are the methods of separation of homogeneous mixtures? Explain any one in detail. [8]
b) Explain the role of temperature and pressure during the choice of reactor. [8]

P.T.O.

Q5) a) What are the methods of separation of heterogeneous mixture? Explain any one. [10]

b) Explain the concept of azeotropic distillation as a choice of separator. [8]

OR

Q6) Write short note on any three : [18]

a) Choice and selection criteria for separators.

b) Reaction path.

c) Reactor performance.

d) Process synthesis.

SECTION - II

Q7) a) Discuss thermal coupling for direct and indirect distillation sequencing. [8]

b) What do you mean by distillation sequencing? Explain it for four component system. [8]

OR

Q8) a) Explain with diagram the concept of side rectifier and stripper arrangement. [8]

b) Write a short note on - distillation sequencing using thermal coupling. [8]

Q9) a) Explain composite curve with suitable example related to heat recovery problems. [8]

b) Write a short note on - Heat recovery pinch. [8]

OR

Q10) a) Discuss integration of heat pump schematically. [8]

b) Write a short note on - overall heat exchanger network and utilities. [8]

Q11) a) What are the safety and health consideration during the synthesis of chemical process. [10]

b) Explain the intensification of hazardous materials. Discuss major hazards in process plants. [8]

OR

Q12) Write a short note on - any three : [18]

a) Energy targets.

b) Explosion hazards.

c) Quantitative measures of inherent safety.

d) Toxic release.



Total No. of Questions : 12]

SEAT No. :

P3206

[Total No. of Pages : 2

[4859] - 271

B.E. (Chemical) (Semester - I)
Advanced Materials
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each Section.*
- 2) *Answers to the two Sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

SECTION - I

- Q1)** a) Discuss Advanced Metallic Systems. [8]
b) Write down the different Steels for special applications with example. [10]

OR

- Q2)** a) Explain in detail Austempered Ductile Iron. [9]
b) Write down the different types of steels used in chemical industries. [9]

- Q3)** a) Describe the different types of polymeric materials with example in detail. [8]

- b) Describe Polymer Technology. [8]

OR

- Q4)** Explain in detail advanced polymeric materials with example. [16]

- Q5)** Discuss in detail Advanced Ceramic Materials with examples used in chemical industrial applications. [16]

OR

P.T.O.

- Q6)** a) Describe Advanced powder synthesis techniques. [8]
b) Explain different Advanced processing methods for Engineering Materials. [8]

SECTION - II

- Q7)** a) Write down the Physical and Chemical properties of Composite Materials. [8]
b) Write down the different advantages and disadvantages of Polymer Composites. [8]

OR

Q8) Explain Reinforcing mechanisms and matrix materials with example in detail. [16]

- Q9)** a) Explain Mechanical behaviour and properties of Metal Composites. [12]
b) Write short note on different types of reinforcement of metal. [6]

OR

Q10) Describe fabrication methods of Ceramic Composites. [18]

Q11) Explain Carbon composites, their properties, fabrication methods and their applications. [16]

OR

Q12) Define Nanomaterials with example. How the nonmaterials are synthesized and write the different applications of nonmaterial's in chemical industries. [16]



Total No. of Questions : 12]

SEAT No. :

P2038

[4859] - 272

[Total No. of Pages : 2

B.E. (Chemical Engineering)
POLYMER TECHNOLOGY
(2008 Pattern) (Semester - I) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

- Q1)** a) Explain in detail different factors which need to be considered for determining thermal properties of polymers. [6]
- b) Explain “Thermoplastics and Thermoset Polymers” with three examples each. [12]

OR

- Q2)** a) Distinguished between Linear, Branch and Cross linked polymers with one example each. [12]
- b) Explain in detail different factors which need to be considered for determining mechanical properties of polymers. [6]
- Q3)** a) Explain in detail with two examples Solution Polymerization Technique. [10]
- b) Write a note on “Condensation polymerization”. [6]

OR

- Q4)** a) Explain with one example in detail Emulsion Polymerization Technique. [10]
- b) Write a note on Suspension Polymerization. [6]

P.T.O.

Q5) Explain in detail M_n , M_w , M_v , Polydispersity Index with importance. [16]

OR

Q6) a) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 10 molecule of 10,000 monomer lengths and 190 molecules of 20,000 monomer lengths and 25 molecules of 2,000 monomer lengths. [4]

b) Write a note on “Effect of Molecular weight on Engineering Properties of Polymers”. [12]

SECTION - II

Q7) a) Discuss the mechanism of Free Radical Polymerization and derive necessary equations kinetics of Free Radical Polymerization. [12]

b) Discuss Gel Effect in Chain Growth Polymerization. [6]

OR

Q8) a) Discuss “Kinetics Coordination Polymerization.” [12]

b) Explain with example importance of Chain Transfer Agents. [6]

Q9) a) Explain Dough Molding Composition. [6]

b) Explain in detail with neat sketch Resin Transfer Molding. [10]

OR

Q10) Discuss with two examples any eight additives used in polymer Industry. [16]

Q11) Give technology overview for the polymerization of Unsaturated polyester and Epoxy Polymers. [16]

OR

Q12) Give technology overview for the polymerization of Butyl Rubber and Nylon. [16]



Total No. of Questions : 12]

SEAT No. :

P4434

[Total No. of Pages :3

[4859]-273

**B.E. (Chemical Engineering)
PIPING DESIGN AND ENGINEERING
(2008 Pattern) (Elective - II(d))**

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Answer three questions from each section.*
- 2) Neat diagrams must be drawn wherever necessary*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data, if necessary.*
- 5) Answers to the two sections should be written in separate Answer books.*

SECTION-I

- Q1)** a) Explain the pipe sizing procedures based on the different criteria? [10]
b) State and explain the Hazen-Williams equation for calculation of head loss in water piping systems? [8]

OR

- Q2)** a) Explain the role of piping engineer in Construction and Commissioning phase of a chemical process? [8]
b) Water flows through a 16-in pipeline (0.375-in wall thickness) at 3000 gal/min. Using the Hazen-Williams equation with a C factor of 120. calculate the pressure loss due to friction in 1000 ft of pipe length? [10]

- Q3)** a) Discuss the various types of gasket according to ASME B 16.5 and B16.47 for flanges? [8]
b) State and explain the different material standards for metallic piping components? [8]

OR

- Q4)** Discuss the different sections of ASME B31 Code for Pressure Piping? [16]

- Q5)** a) Explain the steps used for sizing of pressure relief valves as per API RP 520? [8]
b) Discuss the three methods used for sizing of Rupture Disk as per ASME code? [8]

P.T.O.

OR

- Q6)** a) How to size control valves for liquid and steam service? [8]
b) Classify the different types of safety valves based on: [8]
i) Lift
ii) Actuation
iii) Seat design
iv) Lever
v) Bonnet

SECTION-II

- Q7)** a) Explain the Homogenous and Heterogeneous Flow in slurry pipe lines?[8]
b) How to calculate NPSH? What are the parameters considered for calculating NPSH? [8]

OR

- Q8)** a) How to determine the pipe size for steam piping? [8]
b) A pipe is to be designed to carry 150 CFM free air at 100 psig and 80°F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? [8]

- Q9)** a) Discuss the following points for locating the pipe racks of a process unit[8]
i) Pipe rack width and number of levels
ii) Elevations and bent spacing
b) What is P&ID? From a properly made P&ID, piping engineer should obtain all essential details required for piping. Make a list of all such essential details which should be available from a properly prepared P & ID. [10]

OR

- Q10)**a) Discuss in detail the typical piping layout considerations for distillation column and Heat exchangers? [10]

b) Explain the types of plot plan and their advantages? [8]

Q11)a) Calculate the heat gain on a typical chilled water pipe in an enclosed space.[8]

Following data is available:

Pipe size: NPS 2 (DN 50),

2.375 = in (60 mm) actual OD

Operating temperature: 38°F

Ambient temperature: 92°F

Insulation thickness: 2 in (mm) nominal

2.11 in (54 mm) actual

Insulation type: Cellular glass

Length of pipe: 120 linear ft (36.5 m)

b) Write down the different insulation material classifications mostly used in the industrial and commercial piping industry? [8]

OR

Q12) Write short notes on: [16]

- a) Major phases in the life cycle of chemical process plant
- b) Pipeline Economics
- c) Design procedures for insulation of piping
- d) Critical thickness of insulation



Total No. of Questions : 12]

SEAT No. :

P3207

[Total No. of Pages : 3

[4859] - 274

B.E. (Semester - II)

CHEMICAL ENGINEERING

Advanced Separation Processes

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers three questions from sections I and three questions from section II.
- 2) Answer to the two sections be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

Q1) a) What is cross flow filtration? What are its advantages over dead end filtration? [6]

b) Explain in detail 'Adsorption Cycle' with neat sketches. [10]

OR

Q2) a) Explain the details the design of chromatography. [6]

b) Explain the basic concept of HPLC process. [10]

Q3) a) Give the application of chromatography in separation of enzymes and proteins. [8]

b) Explain adsorption mechanism in separation of fluid-solid system. [8]

OR

Q4) a) Give the advantages of membrane separation process over other separation technique. [8]

b) Explain the basic types of modules used in Reverse Osmosis. [8]

P.T.O.

- Q5)** a) Calculate the osmotic pressure of a solution containing 0.10 gmol (NaCl/1000g) H₂O at 25°C. Density of water = 997.0 kg/m³ [6]
- b) Write down the classification of the membrane process. [8]
- c) Explain the following terms: [4]
- i) Rejection
- ii) Permeate

OR

Q6) Discuss the following in detail.

- a) Characteristics of the complexing agent used in chemical-complexation. [9]
- b) Reactive distillation process [9]

SECTION - II

- Q7)** a) Write down the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]
- b) Explain 'Collapse and drainage phenomena'. [9]

OR

Q8) Write short notes on

- a) Design and development of flotation equipment. [9]
- b) Application of flotation technique. [9]

- Q9)** a) Explain the adsorption properties and applications of molecular sieve. [8]
- b) Adductive Crystallization. [8]

OR

Q10) Write short notes on :

- a) Zone Electrophoresis [8]
- b) Differentiate between electrophoresis and dielectrophoresis and discuss advantages of dielectrophoresis over electrophoresis techniques? [8]

Q11) Explain the classification of unit operations based on the property difference. [16]

OR

Q12) Write short notes on : [16]

- a) Exchange Reaction
- b) Describe mechanism and applications of supercritical fluid extraction in chemical & biochemical industry?



Total No. of Questions :12]

SEAT No. :

P1824

[4859]-275

[Total No. of Pages :3

B.E. (Chemical Engg.)
f: PETROLEUM REFINING
(2008 Course) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer 3 questions from section I and 3 questions from section II.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

SECTION - I

- Q1) a)** Describe in details about introduction to petroleum industries in India as well as World and its scenario. **[8]**
- b) Describe the tests and properties of Diesel. **[8]**

OR

- Q2) a)** What is the need of refining the crude oil? Describe with suitable examples? **[6]**
- b) Why Pre-refining operation is necessary in the petroleum Industry. **[10]**
- Q3)** What are different types of pipe still heaters? Describe Heating through exchangers and pipe still heaters with schematic diagram? **[16]**

OR

- Q4)** Describe Atmospheric distillation Unit with suitable Diagram and Distinguish between ADU and VDU with respect to various processing parameters? **[16]**

P.T.O.

Q5) a) What is refining operation? Describe HDS techniques with schematic diagram? [2+10]

b) Give the comments on the statement “*Each fraction of crude contains a mixture of compounds with similar boiling points*”? [6]

OR

Q6) Write short notes on: [18]

a) Acid Refining

b) Fluid Catalytic Cracking units

c) Thermal cracking

SECTION - II

Q7) Why coking of crude is necessary? Describe coking process with the typical schematic diagram. [16]

OR

Q8) With neat schematic diagram describes HDM process. [16]

Q9) a) Why additives are added in the petroleum products? Discuss in brief about the additives for gasoline and diesel. [10]

b) Explain the transportation of crude & petroleum products? [6]

OR

Q10)a) What is the blending operation and explain the line blending operation? [8]

b) Discuss the role of catalyst in the refinery along with recent advances in the field of catalytic processes in the refinery? [8]

Q11) What are the feed and products of reforming process? Discuss with neat schematic diagram the Reforming process? **[18]**

OR

Q12) Write short notes on (Any Three): **[3x6=18]**

- a) Additives used in the refinery.
- b) Recent advances in House keeping of petroleum products.
- c) Integration of refinery and petrochemical plants for power generation.
- d) Packing materials in the refinery.

EEE

Total No. of Questions : 12]

SEAT No. :

P3208

[Total No. of Pages : 2

[4859] - 276

B.E. (Chemical Engg.) (Semester - II)
Process Modeling and Simulation
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers three questions from sections I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Why to develop a process model?

b) What is model & What is process modeling.

[18]

OR

Q2) Discuss with the examples in detail.

[18]

a) Lumped Vs distributed parameter system.

b) Steady state Vs unsteady state system.

Q3) What are linear & non linear models? Explain with suitable examples. [16]

OR

Q4) Why differential equations are used in modeling. Explain with example. [16]

Q5) Develop a model for multiple effect evaporator. Write suitable assumptions.[16]

OR

Q6) Develop a model for shell & tube Heat Exchanger.

[16]

P.T.O.

SECTION - II

Q7) Develop a model for packed bed distillation column. [16]

OR

Q8) Explain in detail the simulation scheme for packed bed distillation column.[16]

Q9) Develop a model for 3 CSTR in series. [16]

OR

*Q10)*Develop a model for Trickle Bed reactor. [16]

*Q11)*What is simulation? Explain it with proper example. [18]

OR

*Q12)*Explain any one process simulator in details. [18]



Total No. of Questions : 12]

SEAT No. :

P3209

[Total No. of Pages : 3

[4859] - 277

B.E. (Chemical) (Semester - II)

**Process Engineering Costing and Plant Design
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) Explain factors affecting process selection. [9]
b) Explain the factors that govern selection of plant location. [9]

OR

- Q2)** a) Discuss in detail the techno-economic feasibility of report of a project. [10]
b) Explain significance of laboratory data in process development. [8]

- Q3)** a) Explain impact of taxes and insurance on economic situation of an industry. [8]
b) The original investment for an asset was Rs. 10,000 and the asset was assumed to have a service life of 12 years with Rs. 2,000 salvage value at the end of the service life. After the asset has been in use for 5 years, the remaining service life and final salvage value are estimated at 10 years and Rs. 1,000 respectively. Under these conditions, what is the depreciation cost during the sixth year of the total life if straight line depreciation is used? [8]

P.T.O.

OR

- Q4)** a) Explain the methods for determining depreciation. [8]
- b) A heat exchanger has been designed for use in a chemical process. A standard type of heat exchanger with a negligible scrap value costs Rs. 4000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs Rs. 6800 but will have a useful life of 10 years and a scrap value of Rs. 800. Assuming an effective compound interest rate of 8% per year, determine which heat exchanger is cheaper by comparing capitalized costs. [8]
- Q5)** a) Explain in detail mathematical methods for profitability evaluation with neat diagram. [8]
- b) Explain cost indexes and explain their importance while estimating equipment costs by scaling such as six-tenth-factor rule. [8]

OR

- Q6)** a) Explain with a neat sketch cumulative cash position showing effects of cash flow with time for an industrial operation neglecting time value of money. [8]
- b) A Company has three alternative investments which are being considered. Because all these investments are for the same type of unit and yields same service only one of the investments can be related. If a company In-charge expects 15% rate of return on original investment which one will be suitable? [8]

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs)	10,000	10,000	15,000
Annual Cash Flow (Rs.)	30,000	52,000	59,000
Annual Expenditure (Rs.)	15,000	28,000	21,000

SECTION - II

- Q7)** a) Give difference between market survey and market research. [8]
b) Explain with a neat sketch the break - even chart for production schedule and its significance for optimum analysis. [8]

OR

- Q8)** a) Explain graphical and analytical procedure for optimization with two or more variables. [10]
b) Write a note on optimum conditions in cyclic operations. [6]

- Q9)** a) Explain preparation of Techno-economic feasibility report. [9]
b) Find the values of x , y and z that minimize the function $x + 2y^2 + z^2$ subject to the constraint that $x + y + z = 1$, making use of the Lagrangian multiplier. [9]

OR

- Q10)**a) Write an explanatory note on Pinch technology. [9]
b) Derive the equation for optimum cooling water flow rate in condenser.[9]

- Q11)** Define CPM and PERT and explain the application of the same for setting up a new Chemical plant. Define the activities involved in this project and construct the network diagram. [16]

OR

- Q12)**a) What points should be considered while deciding plant location? Draw a plant layout and name the parts. [8]
b) Differentiate between CPM and PERT. Give one example of each. [8]



Total No. of Questions : 12]

SEAT No. :

P3210

[Total No. of Pages : 2

[4859] - 278

B.E. (Chemical Engineering)

**Artificial Intelligence in Chemical Engineering
(2008 Pattern) (Semester - II) (Elective - III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) Explain Data Objects and Matching using Prolog programming. **[16]**

OR

Q2) With neat diagram, explain the upstream recursive rule. **[16]**

Q3) AI is to be applied for designing a Pump Network. Draw neat sketch indicating steps in design. **[16]**

OR

Q4) Explain in details the backtracking of path with no cut and with cut. **[16]**

Q5) Explain the methodology implied for Structuring an Object-Oriented Program. **[18]**

OR

Q6) Enlist and provide brief description of any three expert systems developed. **[18]**

P.T.O.

SECTION - II

Q7) Describe with examples the challenges in Synthesis of flowsheets. [18]

OR

Q8) Develop a Semantic Network for Distillation Column. Write in details on steps involved with labeled diagrams. [18]

Q9) What is Component Assignment Diagram? Draw and explain in details. [16]

OR

Q10) Describe the Separation Specification Table with diagram. [16]

Q11) Why Constraint Satisfaction strategy is used to solve AI problems? Explain with example. [16]

OR

Q12) Fuzzy Logic Systems are vital in implementation of AI. Briefly explain the Fuzzy systems implied for AI. [16]



Total No. of Questions :12]

SEAT No. :

P1825

[4859]-279

[Total No. of Pages :3

B.E. (Chemical)

**b:ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES
(2008 Course) (Elective - III) (Semester - II) (409349)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Explain the Responsibilities and duties of Energy Manager to be assigned under the Energy Conservation Act 2001. **[10]**
- b) Explain the scope of Energy Conservation and its importance in process industries. **[8]**

OR

- Q2) a)** Define the following terms with suitable examples: **[12]**
- i) Primary and Secondary Energy.
 - ii) Commercial and Non-Commercial Energy.
 - iii) Renewable and Non-Renewable Energy.
- b) Explain the benefits of Energy Efficiency towards Industry, Nation & Globe. **[6]**

P.T.O.

- Q3)** a) Enlist the parameter consider for the selection of optimum insulation thickness. [6]
- b) Define the term energy audit? Explain briefly the difference between preliminary and detailed audit? [10]

OR

- Q4)** a) Define energy audit as per the energy conservation Act 2001. Explain detailed energy audit methodology. [8]
- b) Enlist three basic types of steam traps. Explain thermo static trap in detail. [8]
- Q5)** a) Draw a neat sketch of Distillation Column. Explain How and Where the energy Losses can be minimized in it? [8]
- b) Enlist the ideas for improvement of Boiler efficiency. [8]

OR

- Q6)** a) State the practical applications for the use of thermodynamic analysis to improve energy efficiency. [8]
- b) Explain improvements needed to reduce the available energy losses for fractionation process. [8]

SECTION - II

- Q7)** a) Enlist the checklist for energy conservation in lighting system. [8]
- b) Enlist the checklist for the potential energy conservation opportunities in Boilers and Heat Exchangers. [8]

OR

- Q8)** a) Enlist advantages of Pinch Technology in a Chemical Process Industries. [8]
- b) Explain the concept of process synthesis. What are the guidelines and recommendation for improving process conditions? [8]

- Q9) a)** State different parameters needed for energy audit. And explain atleast five key Instruments needed to measure various parameters for energy audit. [10]
- b) Explain fouling factor. How it affect on performance in Heat exchangers? [6]

OR

- Q10)a)** Explain the importance of good housekeeping in a industry as a measure of energy conservation. Explain in detail. [8]
- b) Draw the neat diagram of Tripple Effect Evaporator and explain the opportunities for energy conservation. [8]
- Q11)a)** Write short notes on: [12]
- i) Process Design for Energy Conservation.
 - ii) Energy Savings in good house keeping.
 - iii) List any three energy loss components in chemical plant.
- b) What are the important precautions to be addressed while designing a Dairy Industry. [6]

OR

- Q12)a)** Discuss the role of a equipment manufacturer in the development of Industry. [8]
- b) Explain the importance of automation in the process industries. Explain its key role in energy conservation. [10]

EEE

Total No. of Questions : 12]

SEAT No. :

P3554

[Total No. of Pages : 4

[4859] - 28

B.E. (Civil)

WAVE MECHANICS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Your answer will be valued as a whole.*
- 6) *Use of electronic pocket calculator is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Discuss classification of waves. [4]
- b) Write a short note on wave rider buoy. [4]
- c) Obtain the values of significant wave height and period in deep water generated by a wind (corrected) speed of 24.2 m/s and lasting for 3 hours over a fetch of 100 km. State whether the sea is fetch controlled or duration controlled. Use SMB curves. [8]

OR

- Q2)** a) Define fully developed sea, partially developed sea, swell. [6]
- b) Discuss the process of wave generation. [4]
- c) Discuss the corrections required to be done in wind velocity measured 10 m above mean sea level. [6]

P.T.O.

- Q3)** a) Obtain expression for pressure below sea surface. [6]
- b) Draw a figure showing relative profiles of linear, Stokian, Cnoidal and solitary waves in a single sketch. [4]
- c) A wave with a period of 8 sec in a deep water depth of 15 m and significant wave height of 5.5 m. Find the local horizontal and vertical velocities and accelerations at an elevation of $Z = -5$ m below the SWL when $\theta = 60^\circ$. [8]

OR

- Q4)** a) Prove that water particle displacement follows the elliptical profile.[6]
- b) State all assumptions of a wave theory. What are additional assumptions for a linear wave theory. [4]
- c) A wave with period of 10 sec and significant wave height of 2.5 m moves towards the shore normal to the sea bed contour. Obtain the rate at which energy per unit width is transported towards the shoreline. Find total energy delivered in 2 hours. [8]

- Q5)** a) Write short note on uses of wave spectra. [6]
- b) Write short note on Pierson-Muskowitz Spectrum. [4]
- c) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Weibull distribution in detail. [6]

OR

- Q6)** a) Distinguish between short term analysis-long term analysis, probability density function-probability distribution function, stationary process-ergodic process, autocorrelation function-spectral density function.[10]
- b) Write short note on JONSWAP method. [6]

SECTION - II

- Q7)** a) Derive assumption in the theory of refraction. [6]
- b) What is wave breaking? Discuss with respect to interaction with current and solitary theory. Discuss various ways of wave breaking. [6]
- c) Write in brief about wave reflection. [6]

OR

- Q8)** a) A wave has 3m height and 7 seconds period in deep water. It travels towards shore over parallel bed contours. If its crest line makes an angle of 30 with the bed contour of 10 m before refraction. Calculate the wave height after crossing this contour line. [10]
- b) Write short note on wave set up and set down. [8]
- Q9)** a) Draw Minikin's wave pressure diagram. State formula for total breaking force on wall and total moment about toe. [8]
- b) What is effect of angle of wave approach on breaking or broken waves? Discuss effect of non-vertical walls on breaking and broken wave forces. [8]

OR

- Q10)** a) Draw sketches for pressure distribution of non breaking wave forces when crest appears on the wall and trough appears on the wall. [8]
- b) For a smooth faced vertical wall the incident wave height is 2.5 m and depth at the structure of the toe is 3 m. For a wave period of 9 sec find the height of the clapotis crest and trough above the bottom (yc and yt) [8]

- Q11)** a) Write in brief about calculation of wave forces using Dean's theory. [10]
- b) A one meter jacket leg is subjected to an attack of waves which are 4 m high, 55 m long and 7 seconds in period. Determine the maximum drag force, maximum Inertia force, Total Force at $\theta = \pi / 4$ at a location 8 m below SWL. The water depth is 60 m. Take $C_D = 1$, $C_M = 2$, $\rho = 1030 \text{ kg/m}^3$. Use linear theory. [6]

OR

- Q12)** a) Derive equation for variation of drag force along the total member length of vertical member. [8]
- b) Discuss effect of roughness on C_D and C_M . [4]
- c) Write short note on wave slam. [4]

XXXX

Total No. of Questions :12]

SEAT No. :

P1826

[4859]-280

[Total No. of Pages :3

B.E. (Chemical)

**c-CHEMICAL PROCESS SAFETY
(2008 Course) (Elective - III) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer 3 questions from section I and 3 questions from section II.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define Toxicology. Explain how toxicants enter biological organisms?[8]

b) Define and explain OSHA incidence rate, FAR and FR? [8]

OR

Q2) Explain the three types of chemical plant Accidents. Discuss any one of the significant disasters in detail? [16]

Q3) a) How will you evaluate worker's exposure to volatile toxicants by toxic vapors? [8]

b) Explain material safety data sheets (MSDSs) with the format during an industrial hygiene study? [8]

OR

Q4) Explain the importance of industrial hygiene. Discuss the identification and evaluation of industrial hygiene? [16]

P.T.O.

- Q5)** a) Discuss in detail flammability characteristics of liquids and vapors? [9]
b) Explain fire triangle in detail. Distinguish between fires and explosion?[9]

OR

- Q6)** Write short notes on the following: [18]
a) Deflagration and detonation.
b) Minimum oxygen concentration and inerting.
c) Confined and unconfined explosion.
d) Upper and Lower Flammability Limits (LFL and UFL).

SECTION - II

- Q7)** a) Discuss how flammable and Toxic chemicals are stored and handled?[8]
b) What are the preventive and protective measures to prevent fire in chemical industry? [8]

OR

- Q8)** a) Discuss in detail about prevention of fires and explosions? [9]
b) Write a short note on Hazard and operability studies (HAZOP). [7]
Q9) a) Differentiate between Hazards, Risk and Safety. Give classification of Hazards? [8]
b) Give the details of review of probability theory for risk Assessment?[8]

OR

- Q10)**a) Explain the classification of Hazards and Hazard ratings? [8]
b) Explain in detail about revealed and unrevealed failure? [8]

- Q11)**a) Discuss the emergency shutdown systems? [8]
- b) How are disasters tackled? Explain the plan for emergency? [10]

OR

Q12) Explain in detail: [18]

- a) Disaster management.
- b) Personal protective equipments.
- c) Role of computers in safety.
- d) Safety checklist for a chemical process plant.

EEE

Total No. of Questions : 12]

P3550

SEAT No. :

[Total No. of Pages : 3

[4859] - 281

B.E. (Chemical Engineering)

FOOD TECHNOLOGY

(2008 Pattern) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer THREE questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Explain different types of fluids with example encountered in food processing. Give importance of heterogeneity in food technology. [8]
- b) Explain status of Indian food processing and compare with the world. [8]

OR

- Q2)** a) With neat diagram explain how taste can be defined for the particular food product. What are the conventional terms for each segments of taste, [8]
- b) How nutritional value of processed food is determined in the laboratory? [8]
- Q3)** a) Discuss post harvesting technologies food grains. [6]
- b) For which food wet cleaning is used? Explain advantages and disadvantages of wet cleaning? [6]
- c) What is water activity and how it is calculated? Give at least three examples of food with the range of water activity. [6]

P.T.O.

OR

- Q4)** a) With neat diagram explain size sorting machine and its applications. [6]
b) Discuss applications of dry cleaning process with advantages and disadvantages. Name the food for which it is applicable. [6]
c) What do you understand by water activity? List water activity of some. [6]

- Q5)** a) Explain UHT cycle for milk treatment and compare with conventional process. [8]
b) With neat diagram explain oil extraction process from oil seeds. [8]

OR

- Q6)** a) Give neat flow sheet and explain ice-cream manufacturing process. [10]
b) How chemical sterilization is done. Explain methods with example. [6]

SECTION - II

- Q7)** a) With neat flow-sheet describe process of manufacture of jellies. [8]
b) Explain importance of pectin in jam and jelly manufacture. [4]
c) List the preservatives used for beverages and beverages storage. [4]

OR

- Q8)** a) What is canning? Explain process of tomato sauce manufacture. [10]
b) How preservatives are classified. Give examples and explain the action of preservatives to prevent food spoilage. [6]

- Q9)** a) Explain wheat grain grinding and the effect on product and product quality. [8]
b) Discuss with neat sketch industrial frying machines and name food products produced from such units. [8]

OR

Q10)a) Discuss effect of freeze drying and storage on sensory, nutritional characteristics of food. [8]

b) With neat sketch explain frozen food processing and storage. [8]

Q11)a) Explain importance of coating and coating materials used in chocolate industry. [6]

b) What is temper evident packaging? What is its importance in food and beverages industry [6]

c) Explain various types of containers used in food industry stating advantages and disadvantages. [6]

OR

Q12)a) Explain enrobing process used in food industry with examples. [6]

b) Explain temper evident containers and its application. [6]

c) What information should be available on the packaging material of food? [6]



Total No. of Questions : 12]

SEAT No. :

P3211

[Total No. of Pages : 3

[4859] - 282

B.E. (Chemical) (Semester - II)

**Standardization and Quality Assurance in Chemical Process
Industries
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions each from Section I and II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the importance of standardization of [9]
i) Material of construction
ii) Equipment
b) Explain material consumption. Elaborate various policies to regulate material consumption. [9]

OR

- Q2)** a) Explain the objectives and importance of financial management. [9]
b) Explain Qualitative and Quantitative standards of Chemical Process Industries. [9]

- Q3)** a) Enlist the various industry standards. Elaborate two types of industry standards followed in chemical process industry. [8]
b) Explain the formation and functions of BIS (Bureau of Indian Standards). [8]

OR

P.T.O.

- Q4)** a) Explain the following standards [8]
i) ISO standard for food industries
ii) Agmark
b) Explain the role of Statistical Quality Control (SQC) for effective utilization of resources in industry. [8]

- Q5)** a) Elaborate on formation of Indian Standards. Enlist the objectives of product standards. [8]
b) Write an explanatory note on Zero Defects. [8]

OR

- Q6)** a) State the various functions of equipment inspector. [8]
b) Explain the control charts with suitable example. [8]

SECTION - II

- Q7)** a) Explain the objectives and importance of Total Quality Management (TQM). [9]
b) Explain the formation of Quality Circle (QC)? Explain the functions of QC. [9]

OR

- Q8)** a) What is Quality Control? Explain Statistical quality control with suitable example. [9]
b) Explain in detail the advantages and disadvantages of Quality Control. [9]

- Q9)** Explain with example the various standards followed in fabricating a storage vessels for process industry. [16]

OR

- Q10)** Write notes on following concepts [16]
a) Work sampling
b) Zero defects

- Q11)**a) Explain in detail the role of automation in standardization. [8]
- b) Explain ISO. Elaborate on importance of ISO certification in global market. [8]

OR

Q12)Write notes on [16]

- a) Personal protective Equipment (PPE)
- b) ISO 9000 series
- c) Six sigma
- d) HSE management System



Total No. of Questions : 12]

SEAT No. :

P1827

[4859]-283

[Total No. of Pages :3

B.E. (Chemical)

b-CATALYSIS

(Semester-II) (2008 Course) (409350) (Elective-IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Give the classification of the catalysis. **[8]**

b) Give the characteristics of the catalysis. **[8]**

OR

Q2) a) Explain the mass transfer in the catalysis in detail. **[8]**

b) Explain the industrial application of the catalysis. **[8]**

Q3) a) Explain the mechanism of heterogenous catalysis with suitable example. **[8]**

b) Explain in detail the 'physical adsorption and chemical adsorption. **[8]**

OR

Q4) a) Explain the experimental method of analysis for determination of the rate of solid-catalysed reaction. **[8]**

b) Explain the deactivation of the catalysis. **[8]**

P.T.O.

- Q5) a)** Explain the mechanism of solid-catalysed reaction with suitable example. [9]
- b) Explain the N_2 - desorption method for pore volume distribution in the catalysis. [9]

OR

- Q6)** Methanol may be synthesized over a zinc oxide catalyst in temp. Range of 300 to 400° C at a pressure of 200 to 300 atm. The stoichiometry is as follows: $Co + 2H_2 \rightleftharpoons CH_3OH$

Suggest a mechanism for this reaction and find the rate equation corresponds with suggested mechanism. [18]

SECTION-II

- Q7)** From BET plot, estimate the surface area per gm of the catalyst using the adsorption data for N_2 at $-195.8^\circ C$.

P,mm Hg	-	6	25	140	230	285	320	430
Volume adsorbed (cm ³)	-	61	127	170	197	215	230	277

The density of liquified N_2 at $-195.8^\circ C = 0.808 \text{ gm/cm}^3$ [16]

OR

- Q8)** For the catalytic reaction $A \rightarrow 4R$, following rate-concentration data are available. [16]

C _A (mol/lit)	-	0.039	0.0575	0.075	0.092
$-r_A^1$ (mol/ hr. kg)	-	3.4	5.4	7.6	9.1

Determine the size of packed bed (find w) to treat 2500 mol/hr of pure A at 3.2 atm and 117°C to 35% conversion.

- Q9)** Explain the catalytic cracking and application with different catalytic cracking processes. [16]

OR

Q10) Explain the zeolite structure based on framework and sodalite cages. [16]

Q11)a) Derive the M-M equation. [9]

b) Explain the method to determine the M-M kinetics constants using the data taken in mixed flow reactor. [9]

OR

Q12) Propose the mechanism of the enzyme- substrate reaction $A \xrightarrow{\text{Enzyme}} R$, it is observed that this reaction exhibits the following behavior. [18]

- The rate proportional to the total enzyme concentration (C_{ε_0}) at all C_A .
- The rate proportional to the C_A at low C_A .
- The rate is independent on C_A at high C_A .



Total No. of Questions : 12]

SEAT No. :

P3553

[Total No. of Pages : 3

[4859]-284

B.E. (Chemical Engineering)

NANOTECHNOLOGY

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer THREE questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Explain the different types of carbon based nanomaterials along with their physical properties and applications? **[10]**
- b) Write a short note on Diamond nanostructures? **[8]**

OR

- Q2)** a) Explain why molecular beam epitaxy (MBE) is one of best method as compared to other methods, with its advantages? **[8]**
- b) Discuss the various surface modification approaches used for CNT's? **[10]**

- Q3)** a) Compare the CVD and ALD? **[8]**
- b) Explain High pressure CO conversion method for nanotube synthesis? **[8]**

OR

- Q4)** a) Differentiate between bottom-up and top-down approaches? **[8]**
- b) State the merits & demerits of solution-based nano-fabrication techniques? **[8]**

P.T.O.

- Q5)** a) How do the cantilever deflection in AFM analysis affect the passage of laser beams from excitation source to the specimen to the detector? Also explain the merits of AFM compared to other techniques? [8]
- b) Discuss the Bragg's law of diffraction and Scherrer expression in X-ray diffraction technique? [8]

OR

- Q6)** a) Explain the principle and operation of Scanning Probe Microscopes? [8]
- b) What is the basic difference between an SEM & TEM? [8]

SECTION - II

- Q7)** a) State De-Broglie hypothesis and derive the expression for De-Broglie wavelength? [10]
- b) Derive Shrodenger's wave equation? [8]

OR

- Q8)** a) Explain how quantum cryptography is used for secure data communication? [8]
- b) What is effective masses of charge carriers in semiconductor. Derive expression for it? [10]

- Q9)** a) Discuss the concept of self assembly and catalysis in nano colloids? [8]
- b) Write down the various factors affecting on contact angle and wetting? [8]

OR

- Q10)** a) Explain the concept of colloid stability and zeta potential? [8]
- b) Explain experimental procedure for finding out contact angles. Explain with neat sketch. [8]

- Q11)** a) Discuss different types of nanocoatings? Explain its advantages? [8]
- b) Explain Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? [8]

OR

Q12) Write short notes on :

[16]

- a) Nanohydrogel.
- b) Nanomachines & nanodevices.
- c) Self cleaning materials.
- d) Environmental benefits and impacts of nanomaterials.



Total No. of Questions : 12]

SEAT No. :

P1828

[4859]-285

[Total No. of Pages :4

B.E. (Chemical)

d-FUEL CELL TECHNOLOGY (Theory)
(2008 Course) (Semester-II) (Elective-IV) (409350)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Use two separate answer sheets for writing the answers to the two sections.*
- 2) *Draw schematics wherever necessary.*
- 3) *Assume suitable data wherever necessary.*
- 4) *Write the chemical reactions wherever necessary.*
- 5) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) Describe Molten carbonate fuel cell with neat diagram. **[8]**

b) Discuss the advantages and limitations of fuel cell operating at low and high temperatures. **[8]**

OR

Q2) a) Explain thermodynamics steps involved in fuel cells. **[8]**

b) Discuss the operating temperature of different types of fuel cell and its limitations. **[8]**

Q3) Gibbs free energy for the formation of water is -59.69 kcal/mol at STP conditions. In the typical SOFC, the partial pressure of hydrogen, oxygen and water vapor are 0.8, 0.21 and 0.3 atm. Assume that the activities of the components are the proportional to their partial pressures. It is found that open circuit potential at the operating conditions is 1.3 V. Calculate: **[18]**

- i) Standard open circuit potential.
- ii) Operating temperature of the cell.
Faraday's constant is 96487J/V.mol.

OR

P.T.O.

Q4) Develop the comprehensive material balance for the SOFC generating 800 KW power at 85% CHP efficiency and 60% electrical efficiency, by using externally reformed methane as a fuel and theoretical excess air as an oxidizer. [18]

Q5) a) A current density of 15 A/m^2 is obtained when pure hydrogen is fed to SOFC at the pressure of 1.8 atm. Total pressure of gases at anodic side is observed to be 2.5 atm. Air is supplied at 1.8 atm. The cell is operated at 1000°C . The diffusion factor for hydrogen, oxygen and water vapor are 95, 70 and $55 \text{ C/s.m}^2 \text{ atm}$ respectively. Calculate concentration overpotentials across anode and cathode. [8]

b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using following data. [8]

Average current density : 14 A/m^2

Active anode surface area : 0.2 m^2

Fuel Flow rate : 25 mol/h

Fuel Composition : H_2 70% and CO 30%

Air Flow rate : 20 mol/h

Output potential : 230 V

Lower Heating value of fuel : 30000 kcal/kg

OR

Q6) What is the importance of Nernst equation? Derive the Nernst equation for calculating open circuit potential of SOFC using O_2 as an oxidizer and [16]

i) Methanol (50%) and Hydrogen (50%).

ii) Ethanol (65%) and Hydrogen (35%).

SECTION-II

- Q7) a)** Consider hydrogen-oxygen fuel cell operating at 25° C and at atmospheric pressure. Under these conditions, oxygen, hydrogen and product liquid water are in their standard states. Using the data given below, calculate the thermodynamic potential (E) and the heat transfer (Q) between the cell and surrounding to maintain isothermal conditions and the electrochemical efficiency of the fuel cell. [8]

$$\Delta H = - 285840 \text{ J/mol}$$

$$\Delta G = - 237190 \text{ J/mol}$$

$$F = 96487 \text{ J/V.mol}$$

- b) What is steam reforming? What are the advantages of internal steam reforming over external steam reforming? State its limitations. [8]

OR

- Q8) a)** Explain the Kroger-Vink defect structure in solids. [8]
- b) Derive the Butler-Volmer form of equation for the charge transfer rates. [8]

- Q9) a)** Design tubular SOFC to generate 200KW power from methane as a fuel. Single tube has anodic diameter of 20 mm and active length of 1.8 m. [8]
- b) Calculate mole fraction of defect at 150 and 950° C. Defect energy is 66 KJ/mol. Comment on the significance of results. [8]

OR

- Q10) a)** Design a planer SOFC to generate 750 KW power for ethanol as a fuel. [8]
- b) Illustrate and compare between planer and tubular design of SOFC. [8]

Q11)a) What is three phase boundary (TPB)? Explain the mechanism of charge transfer in TPB. [9]

b) Explain the required characteristics of materials of construction, electrode, electrolyte and interconnect for SOFC. [9]

OR

Q12) Explain the design of typical direct ethanol SOFC considering following aspects: [18]

a) Catalyst

b) Structure

c) Reactions and

d) Exit gas characteristics.



Total No. of Questions : 12]

SEAT No. :

P3555

[Total No. of Pages : 2

[4859]-286

B.E. (Chemical)

PETROCHEMICAL ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer papers.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss the importance of petrochemicals and the status of Petrochemical Industries in India. **[8]**

b) Describe the basic raw material for petrochemical synthesis and their sources? **[8]**

OR

Q2) a) What are the main building blocks of petrochemical industry? Give the details of petrochemical products that are produced from benzene. **[8]**

b) Describe the BTX aromatic separation process using suitable diagram. **[8]**

Q3) Draw a flowsheet for production of Naphthene and explain the process with all specifications and process conditions. **[16]**

OR

Q4) Describe CDU with suitable diagram? Distinguish between CDU and VDU. **[16]**

Q5) a) Discuss the Aromatic solvent extraction unit, Draw a suitable diagram. **[8]**

b) Write in details about the various separation and purification techniques used in petrochemical industry. **[10]**

OR

P.T.O.

- Q6)** Write short notes on : **[18]**
- a) Thermal cracking
 - b) 'Ziegler - Natta catalysts'
 - c) Delayed coking

SECTION - II

- Q7)** Draw a schematic diagram and describe the production of terephthalic acid from p-xylene? Discuss the major engineering problems. **[16]**

OR

- Q8)** Discuss in detail about the production of ethylene glycol and the essential Reaction steps for the same. Draw the necessary diagram. **[16]**

- Q9)** a) Discuss polymer synthesis and monomer purification. **[8]**
b) Explain Emulsion polymerization of styrene. **[8]**

OR

- Q10)**a) Draw a neat sketch and explain in detail about production of PVC. What are the major engineering problems associated with this process? **[10]**
b) Explain classification of different polymerization process and discuss its advantages and disadvantage. **[6]**

- Q11)**a) Explain the control of emission from steam crackers using Best Available Technique (BAT) **[9]**
b) Discuss about recent advances in petrochemical plants and refineries in India. **[9]**

OR

- Q12)**a) "Power on, India on" - Write views on power generation through Petrochemical plants and justify the above statement. **[9]**
b) Give the brief description on safety considerations in oil refining industry? **[9]**



Total No. of Questions : 12]

SEAT No. :

P3212

[Total No. of Pages : 3

[4859] - 287

B.E. (Chemical Engineering)
Computer Aided Process Control
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer-books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

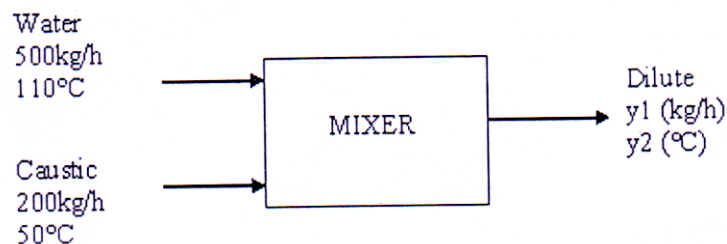
SECTION - I

Q1) With the help of block diagrams and usual notations compare analogue and digital feedback control systems. Give the mathematical representation in terms of transfer functions in both the cases. **[18]**

OR

Q2) What is Distributed Control System? Explain with neat sketch the functions of Control processor (CP), Applications processor (AP), Workstation (WS) and Field bus module (FBM). **[18]**

Q3) a) Hot water at 110°C is pumped into a mixer at 500 kg/h. The water is used to dilute a concentrated caustic substance at 50°C flowing in at 200 kg/h. Diagram of the process is given below. Find out the process gain matrix for the system. Assume that the heat capacities of both streams are the same with no heat of mixing. **[10]**

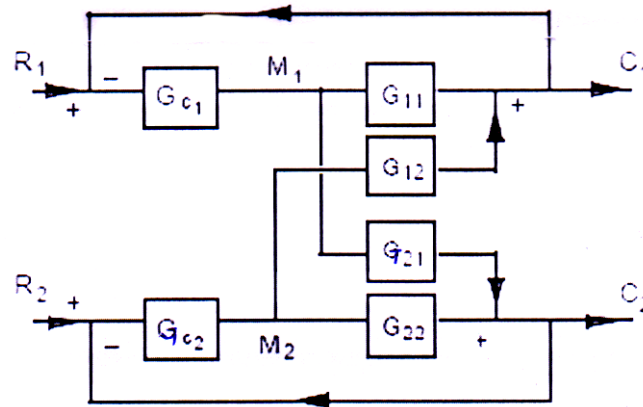


P.T.O.

- b) Based on Process Gain Matrix in (a) above, Comment on the pairing of the I/O variables. Do you suggest decoupling for the system? [6]

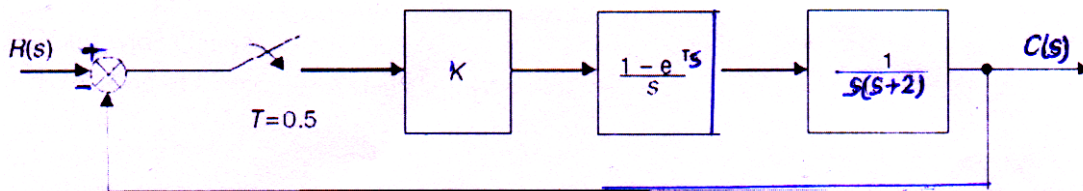
OR

- Q4) a) Two input and Two output (MIMO) system is shown in the following figure. Derive the transfer function for the system showing the mutual loop interactions. [10]



- b) Can the loop interaction be eliminated? What strategy can be applied to eliminated loop interactions in part (a) [6]

- Q5) Following figure shows digital control system. With $K=1$ and sampling time 0.5 seconds. Determine (a) Open loop pulse transfer function (b) Closed loop pulse transfer function. [16]



OR

- Q6) a) Find the z-transformations of following functions [8]
- $f(t) = \delta(t)$
 - $f(t) = e^{-at}$
 - $f(t) = 1 - e^{-at}$
 - $f(t) = \cos(\omega t)$
- b) Describe in detail methods to test the stability of digital control systems. [8]

SECTION - II

Q7) Give the organization of general purpose digital control system with the help of neat sketch. Explain in detail major components of it. **[16]**

OR

Q8) Enlist major Computer Aided Process Control Software. Explain in detail various modules involved in the software with functions of each module. **[16]**

Q9) What is Supervisory Control? Explain in detail with the help of neat diagram. Enlist advantages and disadvantages. **[16]**

OR

Q10) What is Direct Digital Control? Explain in detail with the help of neat diagram. Enlist advantages and disadvantages. **[16]**

Q11) Write Short notes on the following : **[18]**

- a) MIMO control for Distillation column with two products
- b) Plant wide Control
- c) Evolution of Computer Aided Control

OR

Q12) Write Short notes on the following : **[18]**

- a) RGA and Pairing rules for I/O variables
- b) Control system for adiabatic reactor
- c) Hold Devices



Total No. of Questions : 12]

SEAT No. :

P3213

[Total No. of Pages : 2

[4859] - 288

B.E. (Polymer)

**Polymer Compounding
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *All questions are compulsory.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Explain mechanisms solid-solid, liquid-liquid and liquids-solids mixing. [8]

b) Discuss the terms mixing indices and scale of segregation. [8]

OR

Q2) a) Explain dispersive mixing in details. [8]

b) With neat sketch, explain how axial mixing action can be achieved in tumbler blenders. [8]

Q3) a) Explain the methods of making polymer nano composites. [8]

b) Explain the terms compatible blends and incompatible blends. Explain the action of the compatibilizer. [8]

OR

Q4) a) Write a detailed note on fibrous fillers used. [8]

b) Write a note on surface modification of fillers. [8]

P.T.O.

- Q5) a)** Explain the action of coupling agents with a relevant example. [9]
b) Explain the action of UV stabilizers and antioxidants. [9]

OR

- Q6) a)** List various flame retardants used. Explain any their mechanism. [9]
b) Write notes on: [9]
i) Zinc oxide as filler
ii) Carbon black as reinforcing agent
iii) Organic fillers

SECTION - II

- Q7) a)** Explain the role of processing aids and lubricants PVC compounding. [8]
b) Write a note on compounding of nitrile rubber and EPDM. [8]

OR

- Q8) a)** Write a note on reactive extrusion. [8]
b) List the various additives used in rubber compounding. Discuss any two in details. [8]

- Q9) a)** Explain the constructional features and working of a bus ko-kneader. [8]
b) Discuss in details the constructional features and mixing mechanism variable depth mixers and fluted mixing sections. [8]

OR

- Q10) a)** Discuss in details the constructional features and mixing mechanism of pin mixers and slotted fight mixers. [8]
b) Explain the constructional features and mixing action of a CRD mixer with neat sketch. [8]

- Q11) a)** With a neat sketch, explain the mixing action and constructional features of a two roll mill. [9]
b) Discuss in details the classification of twin screw extruders with neat sketches. [9]

OR

- Q12) a)** With a neat figure, explain the mixing action and constructional features of an internal mixer. [9]
b) Discuss the conveying mechanism and mixing action in a co-rotating twin screw extruder. [9]



[4859] - 289

B.E (POLYMER ENGG.)
MOLD AND DIE DESIGN I
(2008 Pattern) (Semester - I)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate answer books.
- 2) Answer Q.1 or Q.2, Q.3 or Q. 4, Q. 5 or Q. 6 from Section - I and Q. 7 or Q.8, Q 9 or 10, Q. 11 or 12 from Section - II.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of calculator is allowed.
- 6) Assume Suitable data if necessary.

SECTION - I

Q1) Design a 2- cavity 2- plate mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [35]

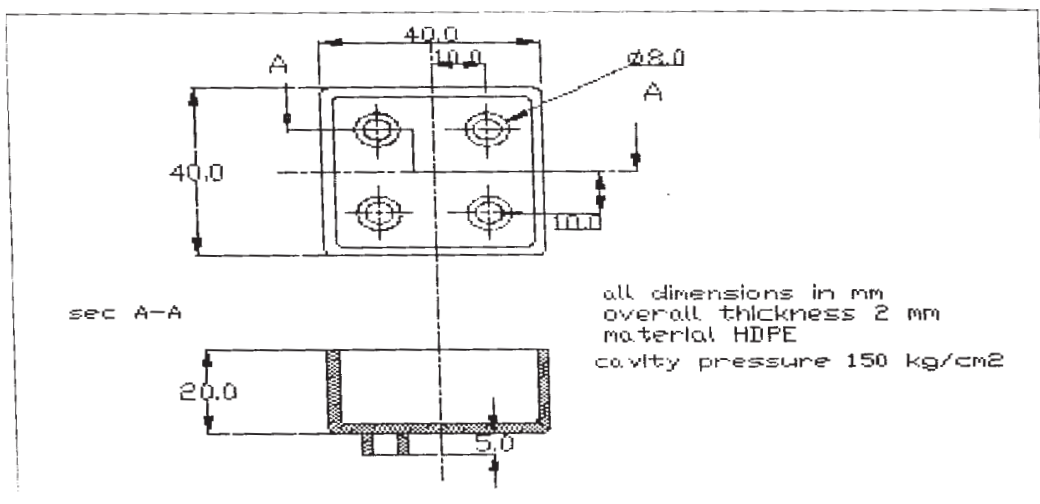


Figure 1

OR

- Q2)** Design a 2-cavity 3-plate mold for the component shown in figure 2. Draw at least two views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [35]

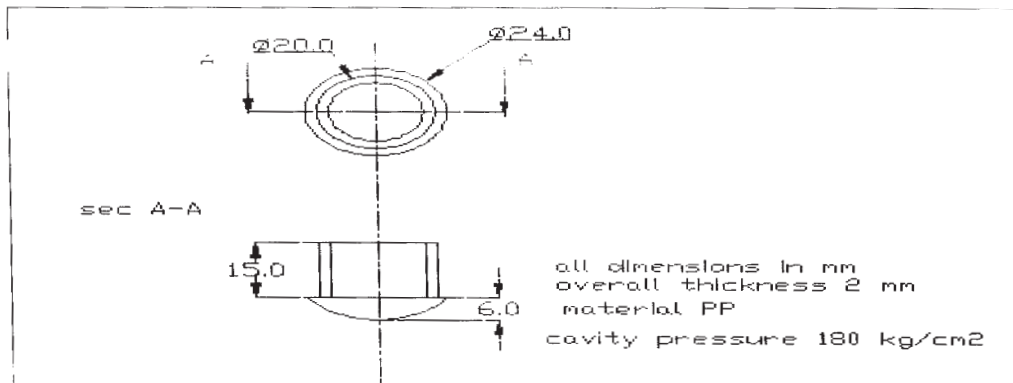


Figure 2

- Q3)** Explain the annular cooling for cavity inserts with a neat figure. [6]

OR

- Q4)** Explain the length bolt method for actuation of stripper plate in details with neat figures. [6]

- Q5)** With a neat labeled sketch, explain the constructional features of an in-line pipe die. [9]

OR

- Q6)** Write down the step wise procedure to determine the pressure drop through the approach section and land section for a rod die. State the relevant formulae. [9]

SECTION -II

- Q7) a)** Draw neat sketches of the following processes indicating heat treatment cycle on temperature - time axis (i) austempering (ii) martempering (iii) conventional hardening. Explain the processes in brief [9]
- b)** Discuss the composition of the type of steel used for core inserts, cavity inserts, guide pillar and guide bush. Mention the hardening method for each. [9]

OR

- Q8)** a) With a neat sketch, explain the tool geometry of a single point tool cutter. [5]
- b) Discuss in details (i) carburizing (ii) nitriding (iii) cyaniding (iv) carbonitriding [8]
- c) Derive an expression for machining time in milling. [5]
- Q9)** a) Write short notes on [8]
- (i) Types of fits with neat sketches
- (ii) Geometric tolerance with neat sketches
- b) Write in short about measurement of surface finish. [8]

OR

- Q10)**a) Write short note on [9]
- (i) Straightness
- (ii) Flatness
- (iii) Parallelism
- b) Write in short about hole-basis system. [7]
- Q11)**a) Explain the constructional features of overlap gate and film gate with neat figures. [8]
- b) Discuss in details the machine specifications of an injection molding machine with respect to moldability for intended applications. [8]

OR

- Q12)**a) With neat figure, explain the constructional features of spigotted guide pillar, guide bush and sprue bush. [8]
- b) What do you mean by runner efficiency? How is it calculated? Calculate runner efficiency for a fully round runner, square runner and a semicircular runner if d is the diameter in case of circular and semicircular runner and the side of the square. [8]



Total No. of Questions : 12]

SEAT No. :

P3163

[Total No. of Pages : 3

[4859] - 29

B.E. (Civil Engineering)
FERROCEMENT TECHNOLOGY
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of calculator is allowed.*
- 6) *Answers to each section to be written in separate answer sheets.*

SECTION - I

- Q1)** a) What is ferrocement? Give the detailed classification of ferrocement and their typical characteristics along with their applications. [8]
- b) Write a note on "Forming of Ferrocement structures. [5]
- c) Merits and Demerits of ferrocement over RCC. [5]

OR

- Q2)** a) Write a note on job requirements of required skills and also the tools & plants used for ferrocement technology. [5]
- b) What are different properties and specifications of raw materials used for Ferrocement Technology? [5]
- c) What are different properties and specifications of raw materials used for Ferrocement Technology? Also write a note on proportioning of cement mortar. [8]

- Q3)** a) Enlist the various construction methods of ferrocement. Explain the skeleton armature method with advantages and disadvantages. [8]
- b) Explain the effect of creep and shrinkage on ferrocement structures and also the protective surface treatment given to the same. [8]

OR

P.T.O.

- Q4) a)** Explain in detail process of constructing ferrocement structures in respect of: **[10]**
- i) Planning the work.
 - ii) Fabricating skeleton.
 - iii) Tying of wire meshes.
 - iv) Mortaring.
 - v) Curing.
- b) Explain in detail specific surface method and crack control method. **[6]**

- Q5) a)** Draw the neat sketches of various structural forms & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. **[10]**
- b) What are the special design considerations for ferrocement and typical features of ferrocement affecting design. **[6]**

OR

- Q6) a)** Draw the neat sketches of various structural forms like 'T', 'U', '+', 'L' & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. **[10]**
- b) Enlist and explain properties of ferrocement structures under static and dynamic loading conditions. **[6]**

SECTION - II

- Q7) a)** Explain the role of ferrocement in building construction of following building accessories: **[10]**
- i) Foundations.
 - ii) Walls.
 - iii) Floors.
 - iv) Roofs.
- b) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. **[8]**

OR

- Q8) a)** Explain in detail the ferrocement building component you seen with reference to following: [10]
material of construction, analysis and design principles, process of construction, quality control and maintenance.
- b) Explain the special characteristics of ferrocement to resist shock affected during earthquakes. [8]

- Q9) a)** Compare all parameters of ferrocement counter forth retaining wall with reference to conventional counter forth retaining wall. [8]
- b) What is ferrocement? What are its different applications with hydraulic structures. Explain in detail any one. [8]

OR

- Q10) a)** Explain design & method of fabrication and casting of counter forth retaining wall. [8]
- b) Compare ferrocement container with conventional container for storage of granular materials. [8]

- Q11) a)** Write a note on: [6]
Ferrocement precast walling and flooring panels.
- b) Explain in detail the industrial precast ferrocement concrete elements you seen with: [6]
- i) Raw materials of construction.
 - ii) Analysis and design principles.
 - iii) Manufacturing process.
- c) Give the testing methodology and quality control for ferrocement materials. [4]

OR

- Q12) a)** Explain role of ferrocement technology in construction of large size special purpose structures like shell and domes. [8]
- b) Why ferrocement is use for pre-casting? Give the different methods of ferrocement pre-casting and explain any one in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P3214

[Total No. of Pages : 2

[4859] - 290

B.E. POLYMER ENGINEERING
Polymer Processing Operation - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary*

SECTION - I

- Q1)** a) Explain Extrusion Blow moulding process with its advantages and limitation. [9]
b) Explain Injection stretch Blow moulding process with its advantages and limitation. [9]

OR

- Q2)** a) Explain the faults during Extrusion Blow moulding and the remedies. [9]
b) Explain the terms: parisan wall thickness control, parisan swell, parisan inflation, cutting devices, process parameters and their effect on product quality. [9]

- Q3)** a) Explain Basic process of thermoforming with proper steps. [8]
b) Give the significance of sheet heating, stretching and wall thickness distribution for thermoforming process. [8]

OR

- Q4)** a) Explain vacuum forming, drape forming and air-slip forming. [8]
b) Explain blister forming, solid-phase pressure forming and plug-assist forming. [8]

P.T.O.

- Q5)** a) Explain Calendaring basic process with material used and products obtained. [8]
b) Explain types of calendars, their construction and configurations. [8]

OR

- Q6)** a) Explain laminating and embossing lines with various parameters and control and their effect on quality. [8]
b) Mention defects, causes and remedy during calendaring process. [8]

SECTION - II

- Q7)** a) Explain Rotational moulding process with the kind of raw material required and the importance of major and minor axis. [9]
b) Give the effect of temperature, speed, cooling time and rate on product quality. [9]

OR

- Q8)** a) Explain effect of internal pressure in rotational moulding along with multilayer rotational moulding. [12]
b) Explain rotational moulding of liquid polymer. [6]

- Q9)** a) Explain Microstructure development in slow crystallizing and fast crystallizing polymers. [8]
b) Give the effect of molecular orientation and , crystallinity on material properties during injection moulding. [8]

OR

- Q10)** a) Explain Gas injection moulding process with its advantages and limitations. [8]
b) Explain water injection moulding as well as microcellular injection foam moulding. [8]

- Q11)** a) Give the methods used for machining of polymers along with tool geometry and other machining parameters. [10]
b) Explain LASER machining process. [6]

OR

- Q12)** a) Give types of inks used for printing techniques. [4]
b) Explain electroplating, vacuum metallizing, texturising, hot stamping, embossing. [12]



Total No. of Questions : 12]

SEAT No. :

P3638

[Total No. of Pages : 2

[4859]-291
B.E. (Polymer)
FIBER TECHNOLOGY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain various terminologies and definitions like fiber, yarn, filament, denier, tenacity. **[9]**
- b) Give classification of fibers, advantages and disadvantages of synthetic fibers over natural fibers. **[9]**

OR

- Q2)** a) Give molecular requirements of fiber forming polymers. Also give properties and applications of synthetic and natural fibers. **[9]**
- b) Explain the source of natural fiber and its spinning technique. **[9]**

- Q3)** a) Give melt spinning techniques used in fiber manufacture. **[8]**
- b) Give solution spinning techniques used in fiber manufacture. **[8]**

OR

- Q4)** a) Give wet jet spinning techniques used in fiber manufacture. **[8]**
- b) Give wet and dry spinning techniques used in fiber manufacture. **[8]**

P.T.O.

- Q5)** a) Explain what is role of spin finish, its composition and function. [8]
b) Give the steps for post spinning operations. [8]

OR

- Q6)** a) Explain false twist process with diagram. [8]
b) Explain air Jet texturing, and stuffer box texturing. [8]

SECTION - II

- Q7)** a) Give steps for polyeter Staple fiber production process with the steps involved. [9]
b) Why identification is required for fibers and how is it done. [9]

OR

- Q8)** a) Why structural changes take place during spinning, drawing and heat setting. Explain in detail the changes for each process. [9]
b) Explain fiber structure properties taking few examples. [9]

- Q9)** a) Give list of Mass coloration methods and explain any 2 in detail. [8]
b) Give mass coloration advantages and disadvantages [8]

OR

- Q10)** a) Give method used for dyeing of synthetic fibers in loose fiber and yarn form. [8]
b) Give types of dyes used for natural fibers and also give differences between dyes and pigments. [8]

- Q11)** a) What are Modified synthetic fibers and how is the modification achieved. [8]
b) Explain nano-fibers and bi-component fibers. [8]

OR

- Q12)** a) Explain optical fibers and their advantages and applications. [8]
b) Explain following terms: denier, tenacity and elongation, spin finish content, percent shrinkage. [8]



Total No. of Questions : 12]

SEAT No. :

P3215

[Total No. of Pages : 4

[4859] - 292

B.E. (Polymer Engineering)
MECHANICS OF COMPOSITES
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section - I and Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from section - II.*
- 2) *Answer to the two sections must be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of scientific calculator and graph paper is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the importance of invariance “ U_1 and U_5 ” as given by Tsai-Pagano. [6]
- b) Give stiffness matrix for transversely isotropic material. [3]
- c) Show that reduced transformed stiffness matrix for orthotropic material is given by

$$[\bar{Q}] = [T]^{-1} [Q] [T]^T$$

Where, [T] is transformation matrix and [Q] is transformed stiffness matrix. Also show that for isotropic material, $[\bar{Q}] = [Q]$. [7]

OR

- Q2)** a) For an orthotropic material, characterization for Poisson's ratio yielded following results:

$$E_1 = 181\text{GPa} \quad E_2 = 103\text{GPa} \quad E_3 = 20\text{GPa}$$

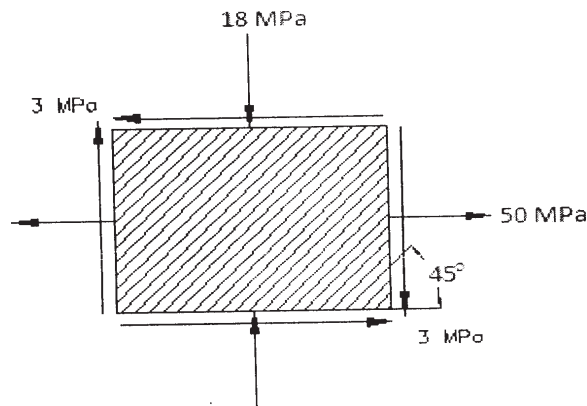
Write down the conditions of restrictions for all the six Poisson's ratio. [3]

P.T.O.

- b) Write down the condition of symmetry (reciprocal relationship) for the Chentsov's coefficient. Also define Chentsov's coefficient. [2]
- c) Obtain an expression for strength of a composite with discontinuous parallel fibers. [5]
- d) Derive following equation with usual notations for orthotropic materials

$$\eta_{xy,y} = E_y \left[\left[\frac{2}{E_1} + \frac{2\nu_{12}}{E_1} - \frac{1}{G_{12}} \right] \sin^3 \theta \cos \theta - \left[\frac{2}{E_2} + \frac{2\nu_{12}}{E_1} - \frac{1}{G_{12}} \right] \sin \theta \cos^3 \theta \right] \quad [6]$$

- Q3)** a) Analyze the failure of the following lamina with loading condition in global co-ordinate system as shown in Fig number I and using Tsai-Hill and Maximum Strain theory.



[10]

Use following data for the lamina

$$E_1 = 300\text{GPa}$$

$$E_2 = 100\text{GPa}$$

$$G_{12} = 10\text{GPa}$$

$$\nu_{12} = 0.3$$

$$F_{1T} = 150\text{GPa}$$

$$F_{1C} = 75\text{GPa}$$

$$F_{2T} = 100\text{GPa}$$

$$F_{2C} = 125\text{GPa}$$

$$F_{12} = 100\text{GPa}$$

The subscript T refers to tensile and C refers to Compression F represents failure strength.

- b) Give merits of Tsai-Wu Theory. [3]
- c) Show that Hoffman criteria reduces to Tsai-Hill criteria for equal strength in tension and compression. [5]

OR

- Q4)** a) Reduce maximum stress and maximum strain theory for uniaxial off axis strength. [9]
- b) Write down Tsai-Hill failure criteria for all quadrants and comment on the stress envelope of Tsai-Hill failure criteria. [9]

- Q5)** a) Write various empirical equations proposed for estimation of ξ - the measure of fiber reinforcement based on geometry and loading conditions in case of Halpin-Tsai equations. [5]
- b) Obtain an expression from basic principle for determination of E_1 using mechanics of materials approach. [5]
- c) Estimate the value of G_{12} from following data
- Matrix shear modulus = 1GPa
- Fiber shear modulus + 150GPa
- Fiber volume fraction = 0.5 [6]

OR

- Q6)** a) Obtain an expression for lower bound on the apparent Young's modulus of the composite material in terms of moduli and volume fractions of the constituent material using elasticity approach. [10]
- b) Explain the effect of application of positive and negative shear stress. [6]

SECTION - II

- Q7)** a) Give force and moment relationship for anti-symmetric cross ply laminates and define regular anti-symmetric cross ply laminate. [10]
- b) Write in short about
- i) Balanced symmetric laminate
 - ii) Quasi-isotropic laminate [8]

OR

Q8) a) Give force and moment relationship for regular symmetric cross ply laminate and regular symmetric angle ply laminate. [9]

b) Find [A], [B] and [D] matrices for $[\pm 45]$ Laminate. The engineering properties of the lamina are:

$$E_1 = 275\text{GPa}$$

$$E_2 = 150\text{GPa}$$

$$G_{12} = 15\text{GPa}$$

$$\nu_{12} = 0.3 \quad [9]$$

Q9) a) Discuss hybrid laminates and explain design procedure. [8]

b) Write in short about

i) Design of tension members

ii) Design of compression members [8]

OR

Q10) a) Give governing vibration equations for symmetric laminates. [6]

b) Derive an expression for the deflection of cantilever beam made up of symmetric laminate under tip loading. [10]

OR

Q11) a) Give test arrangement for 10° off-axis test. Show strain gauge arrangement and explain how you will find shear strain. [8]

b) Explain what you understand by laser shearography. [8]

OR

Q12) a) Write in short about fatigue test for composites. [4]

b) Discuss any one impact test for composites with test arrangement. [4]

c) Give test arrangement for Iosipescu shear test. Show fixture arrangement and explain how you will find shear strain. [8]

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Total No. of Questions : 12]

SEAT No. :

P3216

[Total No. of Pages : 3

[4859] - 293

B.E. (Polymer Engineering)
POLYMER REACTION ENGINEERING
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

- Q1)** a) Discuss the importance of molecular weight and Molecular weight distribution of polymer. [8]
- b) Find the polydispersity Index of the mixture composed of 25 molecules of 10000 monomer lengths and 3800 molecules of 1 monomer lengths.[4]
- c) Explain the role of residence time distribution and the concentration history in Polymerization reaction. [6]

OR

- Q2)** a) Explain the role of change in viscosity in Polymer reaction Engineering. Explain the characteristics of Chain Growth Polymerization. [12]
- b) Discuss the Number Average Molecular Weight, First moment of Pj's Weight Average Molecular Weight terms used for the characterization of mixtures of polymer molecules. [6]
- Q3)** a) Discuss all the mechanism steps to be used in Free radical polymerization with one suitable example. Derive the necessary equation of the rate of Initiation (ri) in terms of Initiator concentration [I]. [8]

P.T.O.

- b) Derive the necessary relationship obtained in giving Molecular weight distribution in batch for free radical type polymerization. [8]

OR

- Q4)** a) Derive the necessary expression for Instantaneous Fractional Degree of Polymerization and Instantaneous weight Degree of Polymerization by using Ionic polymerization. [10]

- b) Discuss and Derive the necessary relationship giving the effect of Perfectly Mixed Flow Reactor on Instantaneous Number Degree of Polymerization for carrying out Free-radical Polymerization. [6]

- Q5)** a) Discuss the advantages of Emulsion polymerization and give at least four polymer names to be produced via emulsion techniques. Explain the role of Critical Micelles Concentration in Emulsion Polymerization techniques. [12]

- b) Write a note on Aqueous Emulsifier Solutions. [4]

OR

- Q6)** Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. Discuss kinetics of Emulsion polymerization and give at least two polymer names to be produced via emulsion techniques. [16]

SECTION - II

- Q7)** Draw process flow sheet for the production of PET and explain the process in detail. Describe in detail VK Tube Reactor for the synthesis of Nylon6. [18]

OR

- Q8)** Describe with neat process sheet the reactor systems used for PVC, HDPE polymers. [18]

Q9) a) Discuss the role of mass transfer in step growth polymerization. [8]

b) Discuss the necessary equation of the total rate of the disappearance of the monomer M via Initiation, Propagation, and the termination reaction by monomer transfer. [8]

OR

Q10) Discuss in detail the Chiu's Model to explain the effect of diffusion at high conversion on the rate constant in Step Growth polymerization. [16]

Q11) Explain the reactor design in terms of following factors Polymerization Mechanism, Stoichiometric Factors, Thermodynamics Factors, and Transport Limitations. [16]

Write a short note on Reactor Selection for carrying out polymerization reaction.

OR

Q12)a) Write in detail about the process control strategies in Continuous polymerization process. [8]

b) Discuss the choice between batch and continuous reactor for polymerization process. [8]

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Total No. of Questions : 12]

SEAT No. :

P3920

[Total No. of Pages : 4

[4859] - 294

**B.E. (Polymer Engineering) (Semester - I)
PRODUCTION PLANNING AND CONTROL
(2008 Pattern) (Elective - II(a)) (Backlog)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to Section—I and Section—II should be written on separate answer book.*
- 2) *Solve 3 questions from Section-I and 3 questions from Section-II.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1) a)** Explain in detail Fulkerson's rule for numbering networks in PERT/CPM. **[8]**
- b) Draw PERT network for the following data. Determine critical path and calculate free float, independent float and total float for the same. **[8]**

Activity	Duration
1-2	7
1-3	6
2-5	5
2-4	4
3-4	0
3-6	4
4-5	7
4-6	8
5-6	5
6-7	4

OR

- Q2) a)** Processing times are given below for the six jobs which should go through machines A, B and C in the order ABC. Calculate optimal sequence to minimize total elapsed time as well as estimate idle time for each machine, for the optimal sequence. **[8]**

Job	1	2	3	4	5	6
Machine A	7	2	6	1	4	1
Machine B	2	3	4	1	1	5
Machine C	8	7	6	9	10	9

- b) Explain the concept of activity, event and resource leveling with respect to PERT/CPM. **[8]**

P.T.O.

- Q3) a)** Derive an expression for a probabilistic inventory model considering following assumptions -. [8]
- Continuous demand
 - Set-up zero
 - Continuous stock levels (stock level are not discrete)
 - Lead time zero
- b) Explain the concept of buffer stock. Explain how is it determined? [8]

OR

- Q4) a)** Derive expression for economic order quantity for EOQ model. Consider following assumptions. [9]
- Production is at finite rate, per unit time
 - Constant demand rate, per unit time
 - Shortages are not permitted
 - Each production run of length t consists of two parts t_1 and t_2 such that there is no replenishment or production during time t_2
 - Zero lead time
 - Holding cost and set-up cost to be taken into consideration
- b) Write as short note on selective inventory management. [7]

- Q5) a)** Elaborate the use of C-chart and R-chart. [6]
- b) Draw the control chart and conclusion for data about cracks (defects) present in injection moulded plastic article, inspected using random selection method. [7]

Sample order	Defects	Sample order	Defects
1	5	8	6
2	6	9	2
3	7	10	7
4	3	11	3
5	2	12	4
6	4	13	3
7	5	14	2

- c) State the advantages of double sampling plan. [5]

OR

- Q6)** a) Discuss in detail Multiple or Sequential Sampling Plan. [6]
b) Explain in brief acceptance sampling plan. [6]
c) Explain in detail the relationship between C_p and C_{pk} . Comment on the situation where $C_p < C_{pk}$ and $C_p = C_{pk}$. [6]

SECTION - II

- Q7)** a) Discuss in detail Assignment model. Elaborate how it can be considered as special case of transportation model. [8]
b) Use North-West corner method to solve given transportation problem to find out best feasible solution. [8]

	Y1	Y2	Y3	Y4	Supply
X1	14	25	45	5	6
X2	65	25	35	55	8
X3	35	3	65	15	16
Required	4	7	6	13	Total 30

OR

- Q8)** a) Using Vogels' approximation method estimate the optimum solution for following transportation problem. [8]

	A1	A2	A3	A4	Availability
B1	5	3	6	2	19
B2	4	7	9	1	37
B3	3	4	7	5	34
Demand	16	18	31	25	

- b) Solve the following assignment problem. [8]

	I	II	III	IV
P	10	12	19	11
Q	5	10	7	8
R	12	14	13	11
S	8	15	11	9

- Q9) a)** Explain in detail single queuing theory. [9]
b) A packaging worker packs blow moulded PET water bottles. The bottles arrived at packaging station in Poisson's fashion with mean rate of 50 per hour. The packaging time has exponential distribution. Calculate the average rate at which the worker should work so as to ensure probability of 0.80 that the bottles will not have to wait more than 10 minutes. [9]

OR

- Q10) a)** Discuss the notations used in queuing theory. Based on these notations explain the classification of queuing models. [9]
b) A servicing station can handle only one truck at a time. The trucks arrive at station every 15 minutes and service time is 30 minutes. Only 4 trucks can be accommodated in the station. Calculate — [9]
- The probability that station is empty
 - Average number of trucks in the system
 - Average waiting time for newly arriving truck

- Q11) a)** Discuss advantages and limitations of decision tree approach. [8]
b) Find the saddle point and solve following game. [8]

		2				
		A	B	C	D	E
1	A	9	3	1	8	0
	B	6	5	4	6	7
	C	2	4	4	3	8
	D	5	6	2	2	1

OR

- Q12) a)** A book seller is selling school books. The probability data for the same is as follows — [8]

No. of copies sold	Probability
20	0.10
21	0.15
22	0.20
23	0.25
24	0.30
	1.00

Cost of a copy is 20 rupees and sale price is 40 rupees. The unsold copies cannot be returned back. How many copies should he order?

- b)** Write a short note on - [8]
- i) Decision theory
 - ii) Decision making with conflict



Total No. of Questions : 12]

SEAT No. :

P3639

[Total No. of Pages : 2

[4859]-295

B.E. (Polymer Engineering)

SURFACE COATINGS AND ADHESIVES

(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Write a short note on dispersing agents, anti-settling agents and corrosion inhibitors in paints. Give at least one example of each. [9]
- b) With suitable examples discuss about the primary and secondary antioxidants used in paints. [9]

OR

- Q2)** a) Discuss about the film formation mechanism in paint. [6]
- b) Explain the terms – Paint, Lacquer, Varnish, Enamel. [8]
- c) Explain the concept of drying oil and no-drying oils. Give examples of each. [4]

- Q3)** Write detail note on any two : [16]
- a) Water based paints
- b) Emulsion paints
- c) Decorative paints

OR

- Q4)** Write detail note on any two : [16]
- a) Acrylic paints.
- b) Industrial paints.
- c) Epoxy paints.

P.T.O.

- Q5)** a) Discuss about the properties of raw materials used in coating applications. [8]
b) Explain the testing of coatings for environmental resistance and ageing properties. [8]

OR

- Q6)** a) Write short note on factors affecting adhesion. [6]
b) Explain the terms – wetting power, hiding power, haze, wet and dry film thickness. [10]

SECTION - II

- Q7)** Write short notes on following theories of adhesion : [18]
a) Mechanical interlocking theory.
b) Electrostatic theory.
c) Diffusion theory.

OR

- Q8)** a) Discuss in detail relevance of surface energy and wettability in adhesion. [9]
b) Explain the guidelines for achieving good adhesion. [9]

- Q9)** a) Explain the concept of structural adhesives. State various polymeric systems used for structural adhesives. [8]
b) Write a short note on principles of adhesive formulation. [8]

OR

- Q10)** a) Alongwith formulation, discuss polyurethane based adhesives. [8]
b) Explain the concept of hot-melt and pressure-sensitive adhesives. [8]

- Q11)** a) Discuss various joints and stresses in adhesive joint. Draw appropriate diagrams for the same. [8]
b) Explain the concept of tack. How tack properties of adhesives are measured? [8]

OR

- Q12)** a) Comment on importance of surface treatment in adhesives. Give suitable examples. [8]
b) Write short note on design of adhesive joints. [8]



Total No. of Questions : 12]

SEAT No. :

P3585

[4859]-296

[Total No. of Pages : 2

B.E.

POLYMER ENGINEERING

(409365-C) Packaging Technology

(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section-I and 3 questions from Section-II.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Define packing. Discuss in detail the purpose and characteristics of packing. [9]

b) Write short note on primary and secondary packaging. [9]

OR

Q2) a) Discuss in detail criteria for selecting packaging material. [9]

b) With merits and demerits compare between plastics and metals. [9]

Q3) a) Explain in detail the concept of temperature evidence packaging. [8]

b) Discuss about Tracing, packing and tracking technique used in quality assurance. [8]

OR

Q4) a) Discuss about various points to be considered while launching packaging design in the market. [8]

b) Write short note on Life cycle assessment. [8]

P.T.O.

- Q5)** a) Write short note on modified atmosphere packaging. [8]
b) Discuss about need of understanding product-packaging relationship. [8]

OR

- Q6)** a) Discuss about oxygen scavengers, and carbon dioxide scavengers and emitters. [8]
b) Write short note on controlled atmosphere packaging. [8]

SECTION - II

- Q7)** a) Comment on importance of polymer morphology in packaging application. [8]
b) What is burst strength? Explain the testing method used to determine it. [8]

OR

- Q8)** a) Discuss about relevance of thermal properties in packaging. [8]
b) Write short note on relevance of water vapour permeability and carbon dioxide permeability in packaging. [8]

- Q9)** a) With suitable examples explain about the need to understand lignin and ash content. [6]
b) Explain the test to determine lignin and ash content. [10]

OR

- Q10)** a) Write short note on physiological properties evaluation. [8]
b) Explain in detail the test carried out to determine stiffness of packaging material. [8]

- Q11)** Write short notes on any two: [18]
a) Bio-based plastics for packaging applications.
b) Flow-rap machine.
c) Importance of labeling.

OR

- Q12)** Write short notes on any two: [18]
a) Polymer nanocomposites in packaging.
b) Considerations for packaging used for export.
c) Biodegradable packaging.



Total No. of Questions : 12]

SEAT No. :

P3217

[Total No. of Pages : 3

[4859] - 297

B.E. (Polymer) (Semester - II)
PRODUCT DESIGN AND POLYMER TESTING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain in details the application of isometric, isochronous and creep curves in plastic product design. [8]
- b) Write a note on life cycle assessment of plastic products. [5]
- c) Write a note on parallel engineering approach in product design. [5]

OR

- Q2)** a) Write a detailed note on design for living hinges and gears. [9]
- b) Write a detailed note on the various steps followed in plastic product design. [9]

- Q3)** a) Discuss in details the method for ultrasonic welding with a neat figure.[8]
- b) Discuss design of different joints for bonding with adhesives. [4]
- c) Discuss the process of resistance welding for plastics. [4]

OR

P.T.O.

- Q4)** a) Discuss in details the various steps used in designing of press fit assemblies. [8]
- b) Write a note on mechanical fasteners used in fastening of plastic components. [4]
- c) Write a note on snap fits used in assembly of plastic components. [4]
- Q5)** a) Write a detailed note on ASTM test methods used for determining of flexural strength using three point and four point bending method.[8]
- b) Discuss the ASTM test method used for determining the Charpy and Izod impact strength. [8]

OR

- Q6)** a) Write a detailed note on ASTM test methods used for determining Vicat softening point and heat distortion temperature. [8]
- b) Write a detailed note on ASTM test methods used for testing of abrasion resistance and fatigue. [8]

SECTION - II

- Q7)** a) Discuss the procedure for determination of specific gravity and density by density gradient method. [9]
- b) Discuss the procedure for ultrasonic testing and beta transmission non-destructive testing method. [9]

OR

- Q8)** a) Write a detailed note on burst testing for pipes. [8]
- b) Discuss the various test methods for determining the properties of foamed plastics.

- Q9) a)** Discuss the procedure for determination of refractive index, luminous transmittance and haze. [8]
- b) Define and explain the test methods for determination of dielectric strength, dielectric constant and dissipation factor. [8]

OR

- Q10)a)** Discuss the test methods used for determination of luminous transmittance and haze. [8]
- b) Discuss the procedure for determination of dynamic electric analysis (DEA). [8]

- Q11)a)** Discuss the procedure for determination limiting oxygen index and UL 94 flammability tests. [8]
- b) Discuss the procedure for accelerated weathering tests and resistance of plastics to fungi. [8]

OR

- Q12)a)** Explain the test methods for determining the barrier properties and stain resistance of plastics. [8]
- b) Explain what the term solvent stress cracking resistance. Discuss in details the test method used for the determination of the same. [8]

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Total No. of Questions : 12]

SEAT No. :

P3218

[Total No. of Pages : 3

[4859] - 298

B.E. (Polymer Engg.) (Semester - II)

MOLD AND DIE DESIGN - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain with neat figures various stages in the working of a collapsible core for ejection of threaded components. [10]
- b) Explain with a neat sketch the rack and pinion arrangement for unscrewing internally threaded components in a multicavity mold.[8]

OR

- Q2)** a) Explain with neat figure, sun and planet system used for unscrewing internally threaded components in a multicavity mold. [8]
- b) Explain in with neat figures, various stages in the working of a rotating core with a extractor plate for unscrewing internally threaded components. [10]
- Q3)** a) Write a short note on cartridge heaters. [4]
- b) With a neat sketch, explain working of a extended nozzle. [6]
- c) Explain with a neat sketch, construction and working of a rectangular manifold. [6]

OR

P.T.O.

Q4) a) Discuss in details advantages and disadvantages of hot runner molds. [8]

b) Explain construction and working of any two types of secondary nozzles. [8]

Q5) a) Explain the factors taken into consideration for designing of molds for rotational molding in details. [8]

b) Write a detailed note on designing and material of construction used for thermoforming molds. [8]

OR

Q6) a) Write a note on designing of injection molds used for making of parision for injection stretch blow molding. [8]

b) Explain the constructional features of flash and positive molds used in compression molding. [8]

SECTION - II

Q7) Design a 2 cavity mold for the component shown in Figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations.[30]

OR

Q8) Design a 2 cavity mold for the component shown in figure 2. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

Q9) a) Write in details the steps followed in designing of flat film dies with the relevant formulae. [10]

OR

Q10) Write a detailed note on the different types of manifold designs used in flat film and sheet dies. [10]

Q11) Write a detailed note on filling analysis and interpretation of results in simulation of injection molding process. [10]

OR

Q12) Discuss the Ellis and the Carreau viscosity models in details. [10]

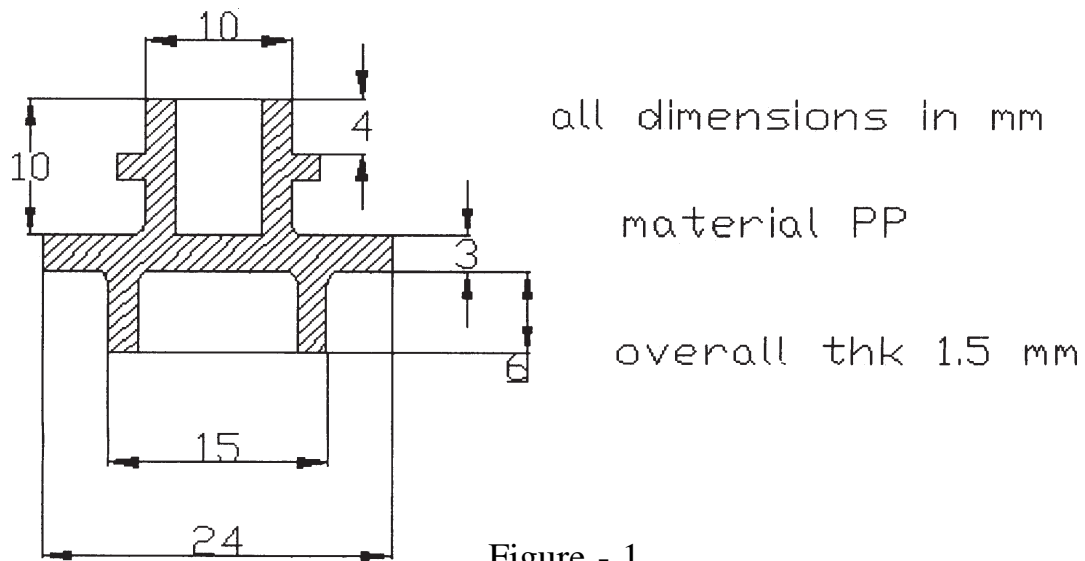


Figure - 1

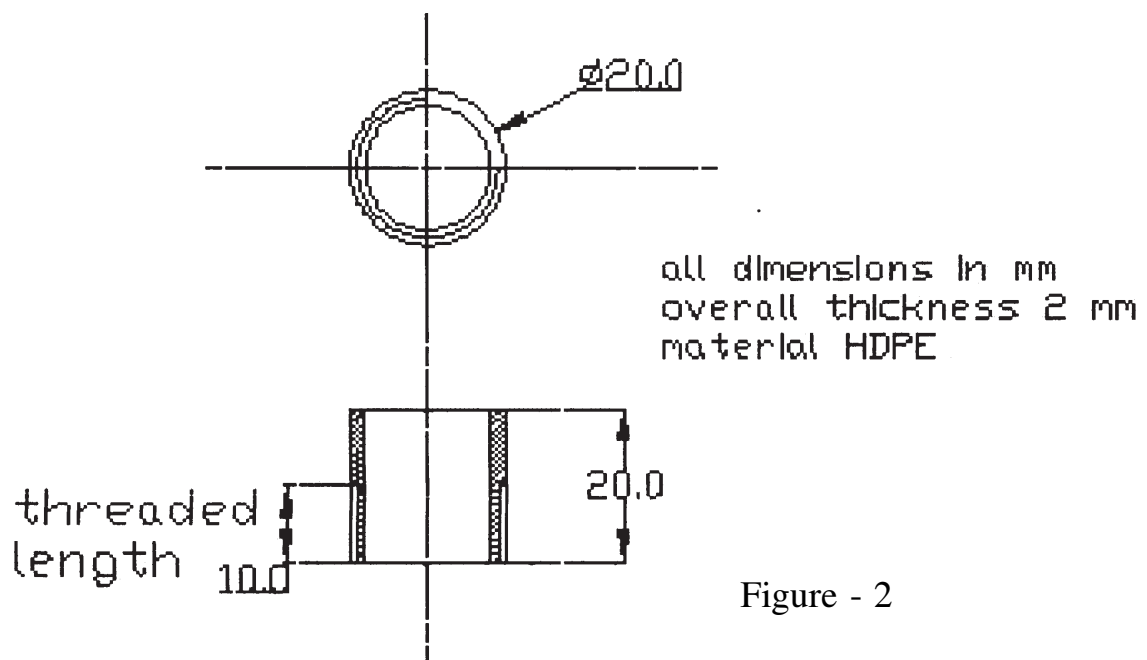


Figure - 2

XXXX

Total No. of Questions : 12]

SEAT No. :

P3219

[Total No. of Pages : 3

[4859] - 299

B.E. (Polymer) (Semester - II)

POLYMER PHYSICS AND CHARACTERISATION

(2008 Pattern) (Elective - III (a))

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :-

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain working of FTIR using the chart method. [9]
- b) Give the different types of vibrational mode. [9]

OR

- Q2)** a) Give the different methods of sample preparation. [9]
- b) Explain ATR method and its advantages. [9]

- Q3)** a) Explain Nuclear Magnetic Resonance Spectroscopy (NMR) in short.[8]
- b) Explain relaxation process, chemical shifts, spin-spin interaction for NMR. [8]

OR

- Q4)** a) Explain how characterization of polymers is done using NMR spectroscopy is done. [8]
- b) Explain how qualitative and quantitative analysis of elements is done using NMR spectroscopy. [8]

P.T.O.

- Q5)** a) Explain GPC working with diagram. [8]
b) Explain working of GPC. [8]

OR

- Q6)** a) Give significance of Bragg law of X-ray diffraction. Also explain lattice and powder diffraction methods. [8]
b) Explain crystal geometry and structural determination of polymers using wide and small angle X-ray diffraction techniques. [8]

SECTION - II

- Q7)** a) Give the Basic principle of electron microscopy and explain it working in short. [9]
b) Why and how specimen preparation is done during electron microscopy. [9]

OR

- Q8)** a) Give working of transmission electron microscopy (TEM) with its advantages. [9]
b) Explain Lamellar, fibrillar globular and spherulite structures in polymers. [9]
- Q9)** a) Explain Thermal transitions and their classification in polymers along with glass transition temperature and its mechanism. [8]
b) Explain characterizing of polymer and polymer blends using differential thermal analysis (DTA). [8]

OR

Q10)a) Explain thermogravimetric analysis (TGA) along with its working and advantages. [8]

b) Explain dynamic mechanical thermal analysis (DMTA). [8]

Q11)a) Describe Optical Properties along with Interaction of light with polymers, reflection and refraction of light by polymers, birefringence, birefringence in isotropic. [8]

b) Give the concept of birefringence and explain birefringence in isotropic and anisotropic materials. [8]

OR

Q12)a) Explain dynamic electric analysis (DEA). [8]

b) Explain Electrical conduction in polymers, dielectric properties, electrical conductivity measurements in polymers and, static charge in polymers. [8]

XXXX

Total No. of Questions : 8]

SEAT No. :

P1676

[4859]-3

[Total No. of Pages : 4

B.E. (CIVIL)

STRUCTURAL DESIGN-III

(2008 Course) (Semester - I)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2,Q.3 or Q.4, from section-I.*
- 2) *Answer Q.5 or Q.6,Q.7 or Q.8, from section-II.*
- 3) *Answer to the two sections should be written in separate answer-books.*
- 4) *Figures to the right indicates full marks.*
- 5) *IS 1343, IS 456, IS 3370 are allowed.*
- 6) *Assume suitable data wherever necessary and mentioned it clearly.*

SECTION - I

- Q1)** a) Enlist the various time dependant and instantaneous losses in prestress concrete. **[4]**
- b) Define the term post tensioning. What are the various post tensioning methods. **[4]**
- c) A post tensioned pre stressed concrete beam section has top flange 500x150 mm, web 150x700 mm and bottom flange 400x250 mm is simply supported over an effective span of 13 meter. The beam is pre stressed with 5 no's of 12/5 Freyssinet parabolic cables ($F_y=1650$ Mpa) with their C.G.100 mm from extreme bottom fiber, stressed one at a time from only one end, calculate total loss of prestress at the age of 120 days if $k=0.0026/m$ length of cable, slip of anchorage =2mm, $C_c=1.8$, $E_s=2 \times 10^5$ Mpa, Concrete grade M40, Creep and relaxation = 2% of initial prestress. **[17]**

OR

- Q2)** a) Explain stress concept and load balancing concept used in design of prestress concrete member with neat sketches. **[10]**
- b) An unsymmetrical prestressed concrete section has top flange 750x200 mm, bottom flange 400mm x 300mm, and web 150 mm x 500 mm, it is supported over a span of 20 m carries super imposed load of 10 kN/m, the effective prestressing force is 1200 KN located at 100mm from soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25 kN/m³. **[15]**

P.T.O.

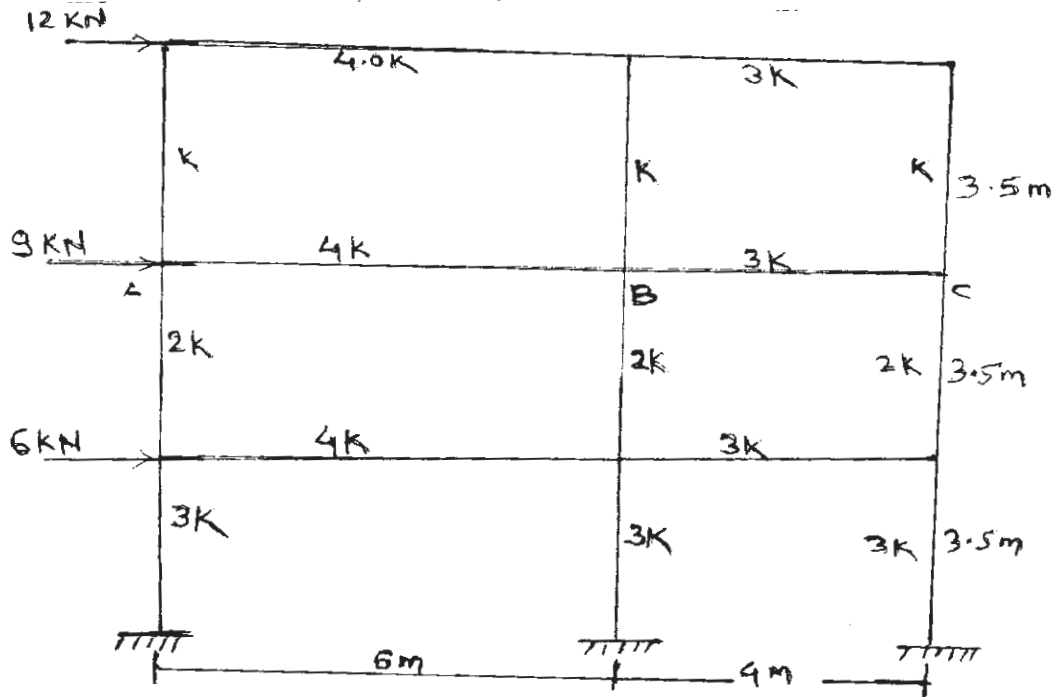
Q3) Design a post tensioned pre stressed concrete beam using I section for flexure to carry a live load of 15 kN/m over a simply supported span of 25 m with M 50 grade of concrete and freyssinet cables of 12/5 ($f_y=1750$ Mpa) or 12/7 ($f_y=1500$ Mpa), Design the End block also. Draw sketches showing details of cable profile, end block reinforcement check for fiber stresses in concrete and deflection is must. [25]

OR

- Q4) a)** State remedial measures to be taken to reduce losses in PSC beams.[5]
b) A post tensioned pre stressed concrete Two-way slab of 7 m x 8.5 m with discontinuous edge to support imposed load of 5 kN/m² using S3 strands each having cross sectional area 100 mm² and $f_y=1900$ Mpa check the safety of the slab at collapse and deflection at service load. Use M45 grade of concrete. [20]

SECTION - II

Q5) Fig (1) shows an intermediate frame of multistoried building the frames are spaced at 5m centre to centre analyze the rigid jointed frame taking live load as 3.0 kN/m² and dead load as 3.5kN/m² for panel AB and BC respectively. The self weight of beam AB is taken as 4 kN/m and for BC as 3.0 kN/m. The relative stiffness are as shown in fig.1 Use portal method for horizontal load and proper substitute frame for vertical loading. Design the beam ABC for combined effect of horizontal and vertical loading using 15% redistribution of moments for vertical load moments. Use M25 and Fe500. [25]

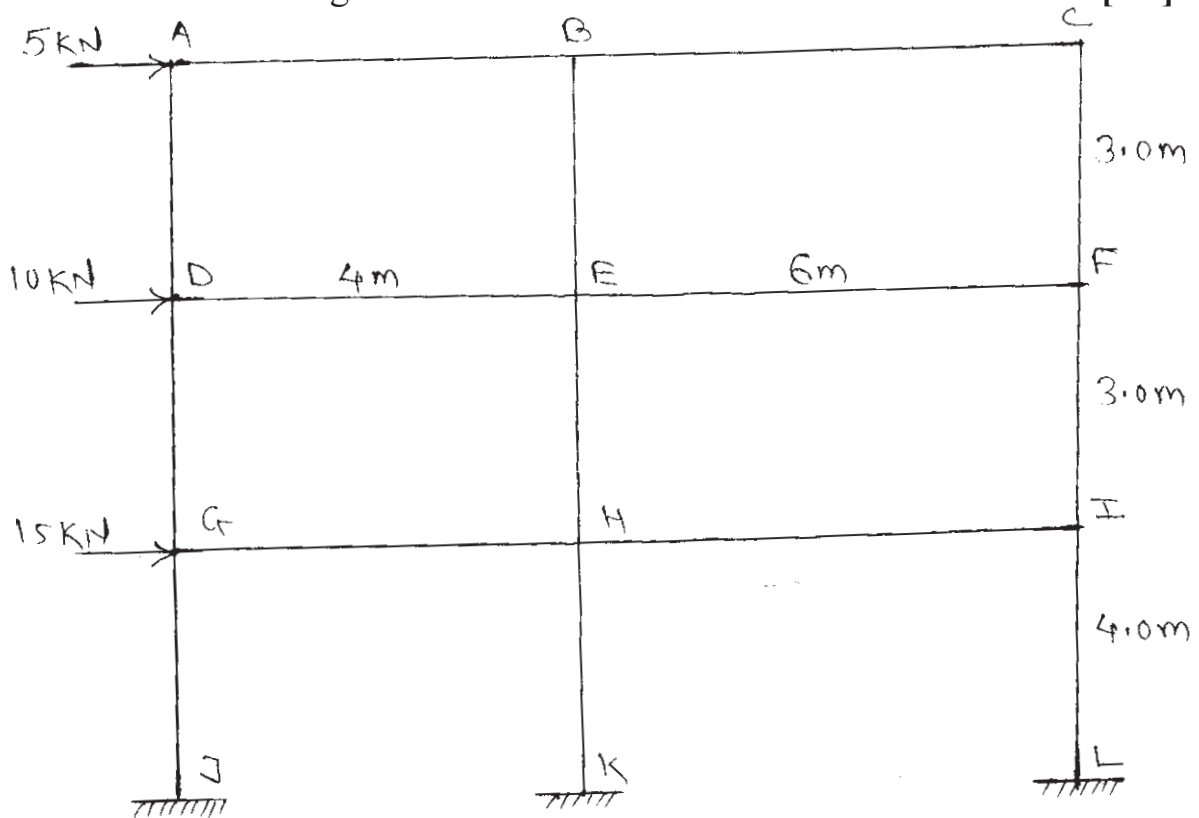


Fig(1) Que. 5

OR

Q6) a) Explain in detail Cantilever method of analysis. [7]

b) Analyze the rigid jointed frame as shown in fig(2) by cantilever method for lateral loads. Flexural rigidity of all members is same. Analyze beam GHI using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 15 kN/m and 17 kN/m on span GH and 19 kN/m and 20 kN/m on HI respectively. The Horizontal forces are as shown in figure. Calculate maximum span moment for GH and support moment at H. Design Beam GHI for combined effect of horizontal and vertical loading using 15% redistribution of moments for vertical loading. Use M25 and Fe 500. [18]



Fig(2) Que. 6(b)

Q7) a) Draw schematic active earth pressure diagram for three layered backfill if γ and K_a are increasing from top layer to the bottom, mentioning pressure intensities at the interface. [5]

b) Design a circular water tank resting on ground of 3.0 lack liter capacity, open at top, the joint between wall and base slab is rigid, the safe bearing capacity of supporting strata is 200 kN/m², Design the wall and bottom slab of the tank. Draw details of reinforcement, use I.S CODE method. [20]

Q8) Design a rectangular combined footing with rib for the following data.

Centre to centre distance between columns =3.3 m, working load on first column =450kN, working load on second column =550 kN, SBC of strata =200 kN/m² assume size of columns as 300 mm x525mm for both columns, use M20 and Fe-500 Draw SFD and BMD, show complete reinforcement details. **[25]**



Total No. of Questions : 12]

SEAT No. :

P3220

[Total No. of Pages : 3

[4859] - 300

B.E. (Polymer Engineering) (Semester - III)

PROCESSING OF COMPOSITES

(2008 Pattern) Elective - III (409370 - B)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :-

- 1) *Answer to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

- Q1)** a) Explain with one example Treatment of Glass Fibers and its use in Polymer Composites. [12]
- b) Explain various types and applications of Natural fibers. [6]

OR

- Q2)** a) Explain in detail with any two examples Treatment of Carbon and Kevlar Fibers and its use in Polymer Composites. [10]
- b) Explain the properties and applications of Carbon and Kevlar fibers.[8]

- Q3)** a) Write a short note on Metal Matrix Composite. [8]
- b) Write a note on Ceramic Matrix Composite. [8]

OR

- Q4)** a) Write a short note on Sheet Molding Compounds. [8]
- b) Explain how to determine the Curing Characteristics of Resin-Catalyst Combination. [8]

P.T.O.

Q5) Explain with neat diagram the followings: [16]

i) Resin Transfer Molding.

ii) Autoclave Processing.

OR

Q6) Explain in detail Filament Winding process. [16]

SECTION - II

Q7) a) Explain in detail with applicable diagrams Resin Film Infusion, Structural Reaction Injection Molding. [12]

b) Discuss theory of void formation in autoclave processing. [6]

OR

Q8) Discuss in detail Matrix flow model, Application of Pultrusion and Design considerations for Pultrusion die. [18]

Q9) a) Discuss different types of Adhesive used in Composites and explain modes of failure in adhesive bonding. [8]

b) Write a note on Machining of composites. [8]

OR

- Q10)a)** Explain thermo mechanical model as applied to filament winding. [8]
- b) Discuss different types of Adhesive used in Composites and explain modes of failure in adhesive bonding. [8]

- Q11)a)** Explain Applications of carbon nano-tubes composites. [6]
- b) Differentiate between polymer Nano-composites with other normal composites. [10]

OR

- Q12)** Explain classification of nano-particles and with two case studies explain Polymer nanocomposites. [16]

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Total No. of Questions : 12]

SEAT No. :

P3221

[Total No. of Pages : 3

[4859] - 301

B.E. (Polymer Engineering) (Semester - II)

SPECIALTY POLYMERS AND APPLICATIONS (Elective - III)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) What are liquid crystalline polymers? Explain the terms — Nematic, Smectic, Cholesteric. Give suitable examples of each. [8]

b) With suitable example discuss blends of liquid crystalline polymers.[8]

OR

Q2) a) Discuss in detail characteristics of liquid crystalline phase. [8]

b) Explain Doi-Edward's theory on dynamics of liquid crystal polymers. [8]

Q3) a) Explain in detail classification of doping based on electron transfer, chemical nature and doping mechanism. [10]

b) Differentiate between chemical and electrochemical methods of conducting polymers' synthesis. [6]

P.T.O.

OR

Q4) a) Explain the analogy between semiconductors and conducting polymers with respect to band theory. Draw appropriate schematic diagrams. [8]

b) Explain the terms — HOMO, LUMO, polaron, soliton. [8]

Q5) a) Write short note on Methods/Techniques used to determine thermal stability of polymers. [9]

b) What are Heat Resistant Polymers? Draw repeating unit structures of 4-heat resistant polymers. State their applications. [9]

OR

Q6) a) Write short note on Ablative Polymers. [9]

b) Discuss about chemical factors affecting thermal stability of polymers. [9]

SECTION - II

Q7) a) With suitable example explain the concept of photosensitive polymer, and positive and negative photoresists. [8]

b) State the polymers used in membrane applications. State the advantages of membrane separation over conventional separation techniques. [8]

OR

Q8) a) Discuss about the requirements for polymer to work as coating additive. [8]

b) Explain in detail casting process used for membrane manufacture. [8]

- Q9)** a) Write short note on Use of Biopolymers in Rehabilitation Aids. [8]
- b) Enlist polymers used for biocatalyst application. State the advantages and disadvantages of biocatalysts. [8]

OR

- Q10)** a) Write short note on Use of Biopolymers in Orthopedic Applications. [8]
- b) Explain in detail Polymers used as Scaffold materials. [8]

Q11) Write short note on any two. [18]

- i) Polymer Concrete
- ii) Polymers used in Green Houses and Mulches
- iii) Polymers in Aerospace applications

OR

Q12) Write short note on any two. [18]

- i) Polymers in seed coating applications
- ii) Controlled drug delivery applications of polymers
- iii) Polymers in communication applications

XXXX

Total No. of Questions : 12]

SEAT No. :

P3521

[Total No. of Pages : 2

[4859]-303

B.E. (Polymer Engineering)
RUBBER TECHNOLOGY

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Comment on molecular requirement for material to function as elastomer. [8]
b) Discuss in detail thermodynamic theory of rubber elasticity. [8]
OR
- Q2)** a) Discuss in detail crystallization in stretched state. [8]
b) Explain the following terms – mastication, vulcanization, scorch, resilience. [8]
- Q3)** a) What are physical and chemical peptizers? Discuss the effect of peptizing agents on vulcanizate properties. [9]
b) Discuss in detail properties and mode of action of lubricants used in rubbers. [9]
OR
- Q4)** a) Alongwith the mechanism of reinforcement and method of incorporation discuss about C-black as reinforcement in rubbers. [9]
b) Explain in detail Banbury mixer used for rubber compounding. [9]

P.T.O.

- Q5)** a) Write short note on Oscillating Disc Rheometer. [8]
b) Explain in detail sulphurless vulcanization. [8]

OR

- Q6)** a) Write short note on Mooney Viscometer. [8]
b) Discuss about Microwave curing. [8]

SECTION - II

- Q7)** a) Discuss in detail injection moulding or rubbers. [8]
b) Comment on mould and design consideration for rubber products. [8]

OR

- Q8)** a) Write short note on Rubber Extrusion. [8]
b) With appropriate schematic diagrams as well as merits and demerits discuss about various roll arrangements in calendaring process. [8]

- Q9)** a) In detail explain the process of manufacturing cellular rubber. [8]
b) Write short note on rubbers used in power transmission. [8]

OR

- Q10)** a) Explain the manufacturing of latex goods by dip-coating method. [8]
b) Discuss in detail manufacturing of O-rings, gaskets and seals. [8]

- Q11)** Write short note on any two : [18]
a) Cure rate determination.
b) Determination of low temperature properties.
c) Rebound resilience.

OR

- Q12)** Write short note on any two : [18]
a) Compression Set and Permanent Set.
b) Testing of diaphragms for valves and pumps.
c) Accelerated ageing test of rubbers.



Total No. of Questions : 12]

SEAT No. :

P3222

[Total No. of Pages : 3

[4859] - 304

B.E. (Polymer Engineering)

POLYMER THERMODYNAMICS AND BLENDS

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 4) *Numbers to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) Describe first law of thermodynamics and State Limitations of The First Law Of Thermodynamics. Explain the following terms: **[18]**

- i) Steady State
- ii) Equilibrium State
- iii) Phase Rule
- iv) Intensive Properties

OR

Q2) Explain in detail Entropy term and State the Third Law Of Thermodynamics. Explain thermodynamic criteria of polymeric dissolution. Describe the condition under which it is not a spontaneous process. **[18]**

- Q3)**
- a) Describe assumptions of Hildebrand in explaining regular solutions. State its limitations of the theory. **[8]**
 - b) Write a short note on effect of molecular weight distribution on phase equilibrium. **[8]**

P.T.O.

OR

Q4) Write a short note on Phase diagram. Define the excess properties and derive the relation for S^E , G^E , H^E , V^E (S = Entropy, G = Gibbs free energy, H = enthalpy, V = volume and suffix E for excess) [16]

Q5) a) Explain with one example. [8]

i) Effect of Hydrogen bonding interaction.

ii) Effect of specific interaction like dipole- dipole interaction.

b) Explain miscibility of blend on the basis of thermodynamic principles. [8]

OR

Q6) Explain and derive 'Flory Huggins equation for polymer blends'. Explain the role of Hilderbrand solubility parameter. [16]

SECTION - II

Q7) a) Explain any two methods of preparation of Polymer Blends with suitable example. [10]

b) Discuss the following terms with suitable examples:

Ease of Processing, Economy, Enhanced Property, Ecology via Polymer Blend technology. [8]

OR

Q8) a) Discuss the advantages and Disadvantages of the following engineering. Polymeric modifier: [9]

i) Polycarbonate (PC)

ii) Acrylonitrile butadiene styrene (ABS)

iii) Polyethylene Terephthalate (PET)

b) With the help of two commercial examples, Property advantages and Applications discuss the term Miscible Blends. [9]

Q9) Discuss with examples Rubber Toughening of Brittle and Ductile Polymer matrix. Discuss the importance of Maleated Polymers in Polymer Blend Technology. [16]

OR

Q10) Discuss Equilibrium Morphology and phase inversion concept in polymer blends. Explain any two methods of characterization (Thermal and Microscopic) of polymer Blends. [16]

Q11) Explain. [16]

- a) IPN of PU/PMMA and
- b) Compatibilized Blend of PS/PP

OR

Q12) Explain applicable Rheological models to explain Miscible and Immiscible Polymer Blends. [16]

XXXX

Total No. of Questions : 12]

SEAT No. :

P1829

[4859]-305

[Total No. of Pages :3

**B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION
(Semester-I) (2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) Clarify the following terms:

[16]

- a) Interacting and Non-interacting processes
- b) Degrees of freedom
- c) Proportional Element
- d) Capacitance Element

OR

Q2) a) Differentiate clearly with suitable example multi capacity and single capacity process. **[8]**

b) Explain in brief Dead time or transport delay processes. Also discuss the effect of P action on dead time dominant processes. **[8]**

Q3) a) With the help of necessary diagrams and equations explain the procedure to test a typical temperature control loop. **[14]**

b) Draw the faceplate of SLPC. **[4]**

OR

P.T.O.

- Q4)** a) Elaborate analysis of pressure control system. [10]
b) Comment on process gain and Loop gain. [8]

- Q5)** a) Discuss application issues such that, equipment specification and control algorithm in feedback control to provide accuracy and reliability. [12]
b) Explain in brief purpose of correlations for Tuning Constants. [4]

OR

- Q6)** a) What do you mean by fine tuning? Explain with suitable example. [8]
b) Discuss the quantitative control performance criteria for set point input changes. [8]

SECTION - II

- Q7)** a) What are the implementation issues of ratio control system? [8]
b) What are different ways to improve nonlinear process performance? Explain in brief velocity limiter. [8]

OR

- Q8)** a) Explain split range control strategy with suitable example. [8]
b) Explain with suitable example Feedback-feedforward control scheme. [8]

- Q9)** a) Discuss in brief influence of interaction on multivariable system behavior. [10]
b) Discuss in brief Decoupling of process variables. [8]

OR

- Q10)** a) Discuss direct and indirect effect of interaction with help of 2x2 systems. [10]
b) Write note on Multivariable control. [8]

- Q11)**a) Explain Smith predictor based model based controller. [8]
b) Explain with neat block diagram the working of Neuro-Fuzzy controller. [8]

OR

- Q12)**a) What is Model predictive controller? Explain with suitable block diagram. [8]
b) Describe step analysis or % incompletion method for finding time constants of a two time constant system. [8]



Total No. of Questions : 12]

SEAT No. :

P1830

[4859]-306

[Total No. of Pages : 4

B.E. (Instrumentation & Control)

DIGITAL CONTROL

(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Find the inverse Z-Transform of the following functions: **[10]**

i)
$$F_1(Z) = \frac{Z+1}{Z^2 + 0.2Z + 0.1}.$$

ii)
$$F_2(Z) = \frac{Z}{(Z+0.1)(Z+0.2)(Z+0.3)}.$$

b) Define the following terms with the help of diagram: **[6]**

- i) Impulse Sampling.
- ii) Data Hold.

OR

Q2) a) Explain the basic building blocks and nature of an output signal after each block of discrete time control system. **[12]**

b) Explain Sampling Theorem and explain aliasing and folding phenomenon. **[4]**

Q3) a) Derive the expression for Velocity form of digital PID controller. **[8]**

b) Consider the system described by the transfer function

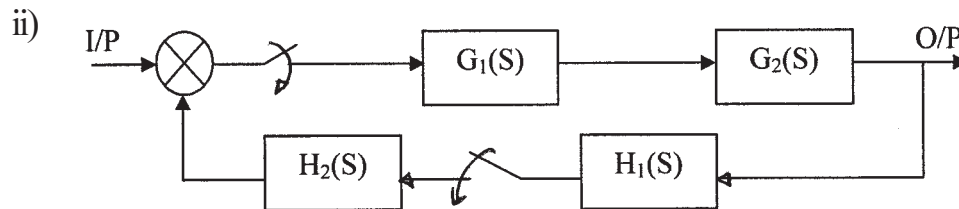
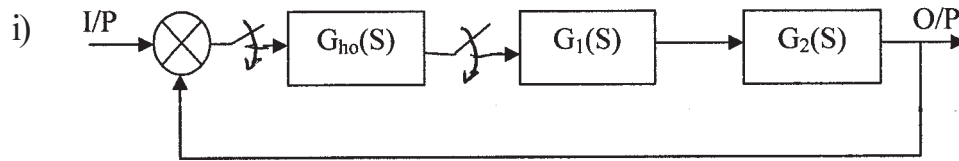
$$G_p(Z) = \frac{(Z+0.5)}{(Z^2 - Z + 0.1)}.$$

Design a deadbeat controller so that the system output sequence C(KT) will follow a step input in minimum number of sampling instances. **[8]**

OR

P.T.O.

- Q4) a)** Derive the expression for Positional form of digital PID controller. [8]
- b)** Find the pulse transfer function for the system block diagram shown below: [8]



- Q5) a)** Explain with the help of diagram stability region in: [6]
- S-plane.
 - Z-plane.
 - W-plane.
- b)** Check the stability by using Jury's Stability Test for the system whose characteristic equation is given below. Explain the necessary and sufficient conditions.

$$\Delta(Z) = 2Z^4 + 7Z^3 + 10Z^2 + 4Z + 1. \quad [12]$$

OR

- Q6)** Find the stable range of the gain 'K' for the unity feedback cruise control system with the analog plant transfer function $G(S) = \frac{K}{S+3}$ and ADC, DAC with $T_s = 0.02$ sec. [18]

SECTION-II

- Q7) a)** Define the following terms: [8]
- Eigen Values.
 - Eigen Vectors.
 - Transfer Function.
 - Pulse Transfer Function.

- b) Determine the controllability and observability of the system below:

$$X(K+1) = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} X(K) + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} U(K)$$

$$Y(K) = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} X(K). \quad [8]$$

OR

- Q8) a)** What are the advantages of state space representation over the pulse transfer function? [8]

- b) Determine the controllability and observability for the transfer function shown below:

$$\frac{Y(K)}{X(K)} = \frac{2}{Z^3 + 6Z^2 + 11Z + 6}. \quad [8]$$

- Q9) a)** Explain the following terms: [8]

- i) State Observability.
- ii) State Controllability.
- iii) Output Observability.
- iv) Output Controllability.

- b) Find out whether the system represented by the following equations is controllable and observable.

$$X(K+1) = \begin{bmatrix} 2.0 & 4.0 & 2.0 \\ -1.1 & -2.5 & -1.15 \\ 2.6 & 6.8 & 2.8 \end{bmatrix} X(K) + \begin{bmatrix} 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{bmatrix} U(K)$$

$$Y(K) = \begin{bmatrix} 2 & 10 & 3 \\ 1 & 8 & 3 \end{bmatrix} X(K) \quad [10]$$

OR

Q10)a) Write a short note on state observers and also mention the types of state observers. [8]

b) Design a feedback controller for the pair $G = \begin{bmatrix} 0.1 & 0 & 0.1 \\ 0 & 0.5 & 0.2 \\ 0.2 & 0 & 0.4 \end{bmatrix}; H = \begin{bmatrix} 0.01 \\ 0 \\ 0.005 \end{bmatrix}$.

To obtain eigen values $\{0.1, 0.4 \pm j 0.4\}$ by using Ackerman's formula. [10]

Q11) Consider the discrete time control system defined by [16]

$$X(K + 1) = G X(K) + H U(K)$$

$$G = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}; H = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Determine the optimal control sequence 'U(K)' that will minimize the following performance index; calculate J_{\min} .

$$J = \frac{1}{2} X^*(8)S X(8) + \frac{1}{2} \sum_{k=0}^7 [X^*(K)Q X(K) + U^*(K)R U(K)]$$

$$Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}; R=1; S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}.$$

OR

Q12)a) Explain Performance Index and the types of Performance Indices. [8]

b) Consider a discrete time control system

$$X(K + 1) = 0.3679 X(K) + 0.6321 U(K) \text{ where } X(0) = 1$$

Determine optimal control law to minimize the following performance index.

$$J = \frac{1}{2} [X(10)]^2 + \frac{1}{2} \sum_{k=0}^9 [X^2(K) + U^2(K)] \text{ also find } J_{\min}. [8]$$



Total No. of Questions : 12]

SEAT No. :

P1831

[4859]-307

[Total No. of Pages : 2

B.E. (Instrumentation and Control)
PROJECT ENGINEERING AND MANAGEMENT
(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) What is project? What are various types of projects? [6]
b) What is project management? Explain role of project manager. [8]
c) What is degree of automation? [2]

OR

- Q2)** a) What is organizational structure? Draw an organizational structure for any manufacturing firm. [8]
b) Write a short note on the various agencies involved in instrumentation type of projects and their interaction involved in Project statement. [8]
- Q3)** a) Explain PERT and CPM methods in detail. Give example. [8]
b) What is project planning? Explain in detail. [8]

OR

- Q4)** a) Write a short note on project management software MS Project. [8]
b) What are the various project life cycle phases. Explain. [8]
- Q5)** a) Prepare Technical specification sheet in s-20 format (any two) [10]
i) PLC.
ii) Turbine flow meter.
iii) Oxygen analyser.
b) Explain what is P & I diagram. Draw the P & I diagram for flow loop control. [8]

OR

P.T.O.

- Q6)** a) What is material balance sheet. Explain with example. [9]
b) What are the various standards used in instrumentation project. Explain in detail. [9]

SECTION-II

- Q7)** a) What are the various types of cables? Explain in brief. [8]
b) Draw installation sketch for differential pressure sensing flow transmitter. [8]

OR

- Q8)** a) List different types of cables and write their specifications. [8]
b) What is loop wiring diagram? Draw a loop wiring diagram of level control loop. [8]

- Q9)** a) What is the meaning of vendor? What are his responsibilities in construction activities? [5]
b) What is commissioning? Explain in detail. What are the various documents required during commissioning? [10]
c) What is cable tray? [3]

OR

- Q10)** a) What is final bid package? Explain in detail. [9]
b) What are the procurement activities involved in project? Explain step by step. [9]

- Q11)** a) Explain inspection of control panel. [12]
b) Write a short note on breakfront control panel. [4]

OR

- Q12)** a) What are FAT, SAT and CAT for control panel. [8]
b) Write a short note on consoles. [8]



Total No. of Questions : 12]

SEAT No. :

P1832

[4859]-308

[Total No. of Pages : 3

B.E. (Instrumentation&Control)
a-BIOMEDICAL INSTRUMENTATION
(2008 Course) (Semester-I)(Elective-I)(406264)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer any THREE questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Figures to right indicate full marks.*

SECTION-I

- Q1)** a) Define bio electrode. Explain various types of basic bio electrodes used for bioelectric potential measurements along with their materials. [8]
- b) Give the typical values of amplitude and frequency of signal arising due to electrical activity of heart, brain, muscles, and eyes. [8]

OR

- Q2)** a) Explain Electrode offset potential? How effect of electrode offset potential is overcome. Explain the various properties that bio-electrode should possesses. [10]
- b) Define and discuss the term “ Biosensors”. [6]
- Q3)** a) Explain Einthoven triangle that connected with defining bipolar leads of ECG. [8]
- b) Explain the block diagram of ECG machine. [8]

OR

- Q4)** a) Briefly discuss the various preamplifiers that are used in bio signal conditioning. [10]
- b) Which information is missing in ECG related to heart defect? Suggest and elaborate on suitable instrument to diagnose the same. [6]

P.T.O.

- Q5)a)** What is importance of Blood pressure measurement in cardiac performance? What are the advantages of direct and indirect B.P measurement? What additional important information is possible to achieve by direct B.P measurement that is not possible by indirect method. [10]
- b) List out various methods used for cardiac output measurement. Explain indicator dilution method with dilution curve. [8]

OR

- Q6) a)** Explain electromagnetic blood flow measurement with neat diagram. [8]
- b) Discuss non invasive blood flow measurement along with neat diagram. [8]
- c) List out the microphones used in phonocardiograph. [2]

SECTION-II

- Q7) a)** What is EEG? Enlist various illness and diseases for which EEG is effectively used. Explain the EEG montage system. [10]
- b) Explain the EEG Amplifier with technical details. [6]

OR

- Q8) a)** Explain the functions of the following. Cerebellum, cerebrum, thalamus and hypothalamus, Medulla oblongata, Pons. [10]
- b) Draw and explain the structure of neuron. [6]

- Q9)a)** Enlist various ophthalmic instruments & briefly explain them? Give their area of application. [10]
- b) Explain the role of Cones and Rods in human vision. [4]
- c) Suggest suitable devices that are used to recover the percentage losses in EAR or EYE, if some residual capacity has been remain with these organs. [2]

OR

- Q10)a)** Define a "Hearing threshold". Explain the speech audiometer and pure tone audiometer. [10]
- b) What are three main sections of Human auditory system? Explain the impedance matching in human hearing phenomenon. [6]

Q11) a) What is Spiro gram? Draw & explain Wedge Spiro meter for respiratory measurement. **[10]**

b) Why inspired and expired gas analysis is of great importance .Draw and explain Thermal conductivity analyzer. **[8]**

OR

Q12)a) Discuss the various precautions to minimize electric shock hazards in medical equipments. Define the terms ‘Let go Current, Hold on current’. **[10]**

b) State the condition of patient at which support of ventilator is essential? What is role of nebulizers and aspirators in ventilator? **[8]**



Total No. of Questions : 12]

SEAT No. :

P3223

[Total No. of Pages : 3

[4859] - 309

B.E. (Instrumentation & Control)

LASER APPLICATIONS IN INSTRUMENTATION

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain in detail the process of emission and absorption of radiation. [8]
b) Explain the importance of Einstein's equations in emissions of radiation. [8]

OR

- Q2)** a) State the different processes due to which the small gain coefficients of laser get affected. [8]
b) Write short notes on [8]
i) Laser modes
ii) Q switching
- Q3)** a) What are different laser system features which are applicable to most commercial and industrial lasers? Explain each in short. [9]
b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.3 mm. The loss coefficient is 800 per metre length and the internal quantum efficiency is 0.7. [4]

P.T.O.

- c) What are the steps that should be followed in a safe laser laboratory operation? [5]

OR

- Q4)** a) Explain the construction and working of GaAs homojunction semiconductor diode laser. [8]
- b) How the laser products are classified for safety standards? [4]
- c) Calculate the threshold pumping power of a Nd: Glass laser for critical population inversion of $9 \times 10^{21}/\text{m}^3$ and spontaneous life time of $250 \mu \text{ s}$. The upper level is at an energy of 1.3eV . [6]
- Q5)** a) Describe how Fabry-Perot interferometer is used with small coherent length source for displacement measurements. [8]

- b) What is Speckle Pattern? Describe subjective and objective speckles. [8]

OR

- Q6)** a) Describe the dynamic tracking of speckle pattern for displacement measurements. [8]
- b) What are the properties of speckle pattern? Describe each in short. [8]

SECTION - II

- Q7)** a) Explain the principle of operation of Laser velocimeter. [8]
- b) What are the two options for the electronic processing of the Doppler signal? Compare it. [8]

OR

- Q8)** a) Explain the frequency domain processing of Doppler signal in detail. [8]
- b) What are the performance parameters of operation of laser velocimeter? Discuss. [8]

Q9) a) What is Sagnac effect? Show how is the phase shift is proportional to the angular velocity. [8]

b) What are the components required for all fiber FOG configuration? Explain each in short. [8]

OR

Q10) a) Show that the frequency of the sagnac signal in RLG is proportional to the angular velocity of rotation. [8]

b) Explain in detail the closed loop configuration of Fiber Optic Gyroscope. [8]

Q11) a) Write a short note on Holographic Interferometer. [9]

b) What are different emulsions used to record the holograms? Mention the characteristics of it. [9]

OR

Q12) a) A thin strip of the hologram undergoing stress parallel to the x-axis is illuminated by a He-Ne laser. The fringes are localized in a plane having slope of 1.4 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]

b) List out the applications of holographic interferometer that you know. Explain any one in detail. [10]

XXXX

Total No. of Questions : 12]

SEAT No. :

P3546

[Total No. of Pages : 3

[4859]-31

B.E. (Civil)

GREEN BUILDING TECHNOLOGY
(2008 Pattern) (Open Elective) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from Section - I and Section - II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Your answers will be valued as a whole.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain and discuss sustainable site selection criteria and orientation. [7]
b) Discuss the uses of following : [3 + 3 + 3 = 9]
i) Building layout plan.
ii) Solar Energy.
iii) Fresnel Lens.

OR

- Q2)** a) Discuss direct and indirect lighting. [6]
b) What is solar concentrator? Discuss. [4]
c) Give note on design of door and window ventilation. [6]
- Q3)** a) Compare the active and passive architecture. [6]
b) Explain the concept of Embodied Energy. [5]
c) Give the selection criteria for material of surface treatment for improvement in thermal comfort with minimum energy input. [6]

OR

- Q4)** a) Explain hybrid system of active and passive refrigeration and air conditioning. [9]
b) Explain the Energy audit of Building in detail. [8]

P.T.O.

- Q5)** a) Discuss the Green rating of Building. [8]
b) What you understand by environmental clearance of buildings? Discuss. [9]

OR

- Q6)** a) Discuss the improvement for thermal comfort. [6]
b) Give note on followings : [4 + 3 + 4 = 11]
i) USGBS.
ii) CDM.
iii) Carbon credit.

SECTION - II

- Q7)** a) Explain water efficient landscaping. [6]
b) Explain any one method with suitable sketch for bore well recharging. [6]
c) Discuss the minimization of water use. [5]

OR

- Q8)** a) Give the note on following : [3 + 4 + 4 = 11]
i) Smart water taps.
ii) Anaerobic filters.
iii) Ion exchanger.
b) Discuss about advanced biogas plant. [6]

- Q9)** a) Explain what is indoor environmental quality. [8]
b) Discuss how the quality of indoor environment is maintained? [9]

OR

- Q10)** a) Differential the following : [4 + 3 = 7]
i) Adhesives and Sealants.
ii) Paints and Coatings.
b) Discuss the uses of following : [4 + 3 + 3 = 10]
i) Composite Wood.
ii) Bamboo.
iii) Jute

- Q11)** a) How the recycling of building materials is beneficial? Discuss. [8]
b) Discuss the Life cycle analysis in brief. [8]

OR

- Q12)** a) Explain the following : [3 + 3 + 3 = 9]
i) Operation Phase.
ii) Construction Phase.
iii) Use of Foudry sand.
b) Explain in details about Construction waste management. [7]



B.E. (Instrumentation and Control Engineering)

ADVANCED CONTROL SYSTEMS

(2008 Pattern) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer any three questions form each section.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right indicate full marks.

SECTION - I

- Q1)** a) Compare Linear and non-linear control systems. [6]
- b) Consider a system as shown in figure. Find the amplitude and frequency of limit cycles. Also comment on stability of the system. [12]

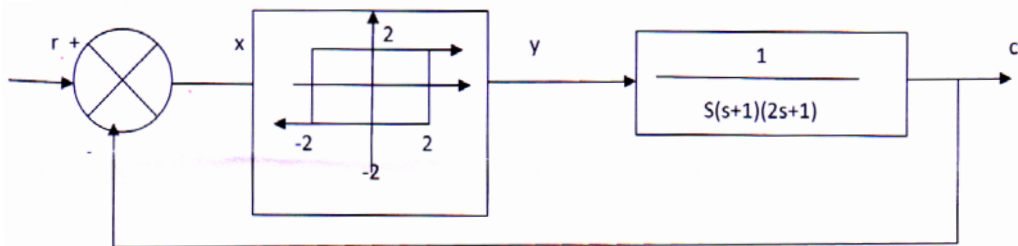


Figure : Q. 1(a).

OR

- Q2)** a) Explain with neat diagram of Limit Cycle. [6]
- b) Obtain the stability of a system shown in figure by using describing function method. [12]

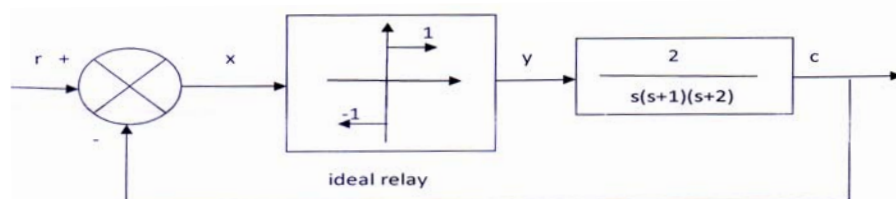


Figure : Q. 2(b).

- Q3)** a) Explain with neat diagram of Frequency domain stability criteria. [8]
 b) Determine whether following quadratic form is positive definite or not [8]
 $Q(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$

OR

- Q4)** a) A second order system represented by $\dot{x} = Ax$ where $A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$
 by using Lyapunov's direct method, determine the stability of the system. [10]
 b) Explain in brief Popov's method and its extensions. [6]

- Q5)** a) Explain with neat diagram of MIT rule for continuous time MRAC system. [8]
 b) Explain basic configuration of Model reference adaptive controller. [8]

OR

- Q6)** a) Explain with neat diagram of Direct model reference adaptive controller. [8]
 b) Explain in detail stability and convergences studies of MRAC systems. [8]

SECTION - II

- Q7)** a) Explain the design of STR using Minimum variance method. [8]
 b) Explain with neat diagram of Implicit self tuning regulator. [8]

OR

- Q8)** a) Explain with neat diagram of recursive parameter estimation of STR. [8]
 b) Explain with neat diagram of different approaches to self-tuning Regulator. [8]

- Q9)** a) Explain in detail robustness studies of multivariable system. [9]
 b) Explain adaptive control technique for temperature control in CSTR system. [9]

OR

Q10)a) Explain the recent trends in adaptive control system. [9]

b) Explain adaptive control technique for control of pulp and dryer control.[9]

OR

Q11) Obtain the control law that minimize the performance index [16]

$$J = \int_0^{\infty} (x_1^2 + u^2) dt$$

For the system given below :
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Explain in brief Matrix Riccati equations.

OR

Q12)a) Explain the performance measures for the optimal control problems.[8]

b) Explain in detail Linear Quadratic optimal regulator problems. [8]



Total No. of Questions : 12]

SEAT No. :

P1833

[4859]-311

[Total No. of Pages : 2

**B. E. (Instrumentation & Control)
d-BUILDING AUTOMATION-I
(2008 Course) (Semester-I)(Elective-I)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is Fire, Classify fire based on the Substance that is fuel for the fire. [8]
- b) Write a short notes on: [10]
- i) Fire Triangle
 - ii) SLC Interface Card

OR

- Q2)** a) Explain Signaling line circuit with neat sketch. [8]
- b) Explain fire stages and detector analogy with neat sketch. [10]
- Q3)** a) List various automatic Fire Detector, Explain any one automatic fire detector with neat sketch. [6]
- b) Explain addressable pull station with neat sketch. [10]

OR

- Q4)** a) Explain Rate of rise heat detector with neat sketch. [8]
- b) Explain Air Sampling Detector with neat sketch. [8]

P.T.O.

- Q5) a)** Explain different guideline for installation of smoke detector made by NFPA. [8]
b) List & Explain category of Fire Alarm System. [8]

OR

- Q6) a)** Explain cause and effect matrix. [8]
b) Explain different guideline for placing heat detector as per NFPA slandered. [8]

SECTION-II

- Q7) a)** Explain Access Control System using serial main & Sub Controller.[10]
b) Write a short notes on: [8]
i) Identification
ii) Authentication

OR

- Q8) a)** Explain Standalone and Network access control system with neat sketch. [8]
b) Explain various attacks on Biometric access control system. [10]

- Q9) a)** Explain the Term Camera resolution in detail. [8]
b) What is data compression technique explain types of compression. [8]

OR

- Q10)a)** What is CCTV Control room list various activities carried out in CCTV control room. [8]
b) Explain DVM with neat sketch. [8]
Q11)a) Explain NIDS with neat sketch. [8]
b) Explain various types of Intrusion detection system. [8]

OR

- Q12)a)** Explain any one application of Perimeter Intrusion Detection system.[8]
b) Explain Camera Sensitivity in Detial. [8]



Total No. of Questions :12]

SEAT No. :

P1834

[4859]-312

[Total No. of Pages :2

B.E. (Instrumentation)

**a: ENVIRONMENTAL INSTRUMENTATION
(2008 Course) (Elective - II) (Semester - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain the optical detection methods used in environmental analysis. [10]
- b) Give examples of portable and stationary analytical instruments (02 each). Compare portable and stationary analytical instruments. [8]

OR

- Q2)** a) Explain the role of instrumentation and control in environmental parameters measurement & analysis. [10]
- b) Explain the sensor requirements with respect to environmental parameters measurement point of view. [8]
- Q3)** a) List 4 sources of water. What do you mean by treatment of water? State 6 objects of treatment of water. [8]
- b) Explain primary and secondary treatment of waste water with neat sketch. [8]

OR

- Q4)** a) Explain about requirements of water quality parameters. [8]
- b) Explain the various water quality parameters. [8]

P.T.O.

- Q5)** a) Draw and explain coagulation in detail. [8]
b) List various types of sedimentation basin. Explain any one in detail. [8]

OR

- Q6)** a) Explain factors considered for designing a settling tank. [8]
b) Explain in detail Ground water level measurements technique. [8]

SECTION - II

- Q7)** a) List the different level measurements techniques in wastewater treatment plants. Explain any two in details. [10]
b) Explain selection criteria for waste water sampling location. [8]

OR

- Q8)** a) Draw and explain in detail the automatic sampler subsystems. [8]
b) Draw and explain wastewater treatment plant. [10]
- Q9)** a) What is air pollution? Explain importance of air pollution control. [8]
b) Explain air pollution from thermal plant. [8]

OR

- Q10)** a) With a neat sketch of automatic wastewater sampling system, explain sample intake, transport and delivery subsystem. [8]
b) Give the general guidelines for selecting optimum sampling locations. [8]
- Q11)** a) Explain open channel and non open channel flow measurement technique. [8]
b) Draw and explain rain water harvesting in detail. [8]

OR

- Q12)** a) Discuss about various devices used in air flow monitoring. [8]
b) Explain in detail about measurement of ambient air quality. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P2040

[4859] - 313

[Total No. of Pages : 2

BE (Instrumentation and Control Engineering)

NANO INSTRUMENTATION

(2008 Pattern) (Elective- II) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figure to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the concept of density of states. Give equations and plots of density of states for [6]
- i) Quantum dot
 - ii) Quantum well and
 - iii) Quantum wire
- b) Explain the electron tunneling through potential barrier. What are the characteristics on which the electron transport depends at the Nano scale Structures. [6]
- c) Explain self Assembly techniques viz. L-B and Electrostatic. [6]

OR

- Q2)** a) Explain CVD for the synthesis of Nano materials with its merits and demerits. [6]
- b) What are the two approaches of making Nano materials? Explain DIP pen Lithography [6]
- c) Explain the various properties of Nano materials. [6]

OR

- Q3)** a) Write a note on AFM. [8]
- b) Explain quality factor, noise of cantilevers and optical actuation of cantilevers. [8]
- Q4)** a) Write a note on STM [8]
- b) Write a note on SNOM [8]

P.T.O.

- Q5)** a) Explain the various characteristics and applications of CNTS. [8]
b) Explain CNT based quantum dot structure and RF filter. [8]

OR

- Q6)** a) Explain the SWCNT based resonant tunneling diode in detail. [8]
b) Write a note on CNT based FET. [8]

SECTION- II

- Q7)** a) Write a note on spin diode and spin transistor. [8]
b) Explain the primary processes involved in the dynamics of ensembles of spins used in a typical spintronic device. [8]

OR

- Q8)** a) Write a note on spin valve device. [8]
b) Write a note on spin Filtering device. [8]

- Q9)** a) Write a note on MOSFET transistor and its downscaling to nm level. [8]
b) Explain Mesoscopic devices at room temperature. [8]

OR

- Q10)** a) Write a note on Resonant Tunneling Devices. [8]
b) Explain single electron transistor with coulomb blockade effect. [8]

Q11) Write short notes on the following.

- a) Nano Chemical Sensors. [6]
b) Particle emitting Nano transducers [6]
c) Plasmonic optical wave guide. [6]

OR

Q12) Write short notes on the following.

- a) Electrically controlled Nano actuators. [6]
b) Molecular switches. [6]
c) Optical Antenna. [6]



Total No. of Questions :12]

SEAT No. :

P1835

[4859]-314

[Total No. of Pages :2

B.E. (Instrumentation and Control)
c: ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Course) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What do you mean integer band positioning? Explain even and odd integer positioning. [12]
- b) Explain noble identity in up sampling and down sampling systems. [6]

OR

- Q2)** a) Explain DFT analysis and synthesis filter bank in detail. [12]
- b) Explain anyone application of multirate signal processings. [6]
- Q3)** a) Explain forward linear prediction. [10]
- b) Explain discrete time random signal and process. [6]

OR

- Q4)** a) Explain backward linear prediction. [10]
- b) What do you mean the AR, MA, ARMA processes, explain in brief. [6]

P.T.O.

- Q5)** a) Discuss the direct and indirect methods of estimation of energy density spectrum. [8]
b) Explain Bartlett method of power spectrum estimation with computational requirement. [8]

OR

- Q6)** a) Explain Yule-Walker method for AR Model parameters. [8]
b) Explain the term power density spectrum. [8]

SECTION - II

- Q7)** a) Brief the different steps in RLS algorithm. [8]
b) Explain application of adaptive filtering to adaptive channel equalization. [8]

OR

- Q8)** a) Explain different steps in LMS algorithm. [8]
b) Explain Adaptive noise cancelling system using adaptive filtering. [8]
- Q9)** a) Compare fixed and floating point dsp processors. [9]
b) Discuss the linear and circular addressing modes in TMS320C67XX. [9]

OR

- Q10)** a) Draw the functional block diagram of TMS320C67XX. Show all details. [9]
b) State different Interrupt Control Registers of TMS320C67XX, discuss in brief. [9]
- Q11)** a) Enlist different properties of CWT. [6]
b) Explain Daubechies Four-Coefficient Wavelet. [10]

OR

- Q12)** a) Explain different features of STFT. [6]
b) Write short note on Gabor Transform. [10]

EEE

Total No. of Questions : 12

P1836

SEAT No. :

[Total No. of Pages :2

[4859]-315

B.E. (Instrumentation & Control)

AUTOMOBILE INSTRUMENTATION

(Elective-II) (Semester -I) (2008 course)(406265D)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *figures to right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) a) What are the factors which motivates automation in auto mobile industry. **[6]**

b) Explain in detail the vehicle motion control. **[10]**

OR

Q2) a) How the petrol / diesel engine works? **[10]**

b) Explain the concept of electronic control system. **[6]**

Q3) a) How does electronic ignition system works? **[10]**

b) Explain the principle of fuel injection system. **[6]**

OR

Q4) a) What are the types of solid state ignition system? Explain the electronic spark timing control system with a neat diagram. **[10]**

b) Explain the principle of Carburettor control system. **[6]**

Q5) a) Write a short note on integrated engine control system with a neat diagram. **[6]**

b) Explain the following modes of Engine Control: **[12]**

- | | |
|--------------------|-------------------|
| i) Engine Cranking | ii) Engine warmup |
| iii) Open Loop | iv) Closed Loop |

OR

P.T.O.

- Q6)** Write short note on following: [12]
- a) i) Idle speed control
 - ii) Engine Mapping
 - b) Explain the various sensors related to engine control system with their functions? [6]

SECTION-II

- Q7)** a) What is ASR? Explain its operation. [8]
- b) Explain automatic transmission electronic control system. [8]

OR

- Q8)** a) What is ABS? Explain its operation. [8]
- b) Write short note on Cruise Control System. [8]

- Q9)** a) Write safety features of any vehicle and Explain in brief the importance of air bag technology in automobile? [8]
- b) Write short note on control system for Antitheft Technology. [8]

OR

- Q10)** a) Explain in brief principal control circuit Component and characteristics of any two of them in brief. [8]
- b) Instrumentation involved in Electronically controlled doors & windows. [8]

- Q11)** a) Explain battery monitoring and control system in details. [9]
- b) Explain the role of ergonomics with respect to automobile. [9]

OR

- Q12)** Write short note on : [18]
- a) Lightening system.
 - b) Air conditioning system in automobile control system.
 - c) Emission Standards.



Total No. of Questions : 12]

SEAT No. :

P1837

[Total No. of Pages :3

[4859]-316

B.E. (Instrumentation & Control)
PROCESS DYNAMICS & CONTROL
(Semester -II) (2008 course)

Time : 3 Hours]

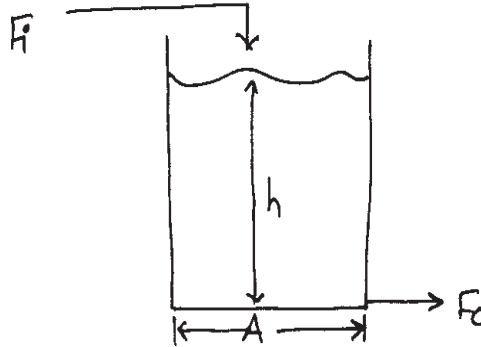
[Max. Marks : 100

Instructions to the candidates:

- 1) Write three Questions from each section.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.

SECTION -I

- Q1)** a) Explain dynamic behavior of linear 1st-order & 2nd - order system. [6]
b) Obtain the mathematical model for following single tank system. [10]



OR

- Q2)** a) Explain input -out put modeling method. Also explain continuous & batch processes. [6]
b) Discuss how second - order processes can be reduced to first -order plus dead time models (SO to FOPDT) with an example. [10]
- Q3)** a) Explain heat exchanger response to change in steam temperature. [8]
b) Explain dynamics of heat exchanger. Explain measurement lag. [8]

OR

- Q4)** a) Discuss lag in shell & headers of heat exchanger. [8]
b) Explain following control schemes for heat exchanger with neat sketch. [8]
i) Throttle steam flow ii) Throttle liquid flow.

P.T.O.

- Q5)** a) Explain safety interlocks of boilers. Explain shrink, swell & inverse response in boilers. [8]
- b) Explain steam temperature & steam pressure control schemes [10] in boilers with neat sketch

OR

- Q6)** a) Explain in detail 3- element control strategy in boilers. [8]
- b) Explain steam pressure optimization. [10]

SECTION-II

- Q7)** a) Explain flow control & temperature control schemes in CSTRs. [10]
- b) Sketch & explain control schemes for end-point detection in CSTRs. [8]

OR

- Q8)** a) With neat sketch explain cascade control scheme in CSTRs. [10]
- b) Explain end- point detection of batch reactors. [8]

- Q9)** a) Explain overhead composition control scheme in distillation column. [8]
- b) Write & explain process equations from material and energy balances of distillation column. [8]

OR

- Q10)** a) Explain column feed control & column pressure control schemes in distillation column. [8]
- b) Write short notes on: [8]
- i) Frequency response.
- ii) Concentration lag w.r.t distillation column.

Q11)a) Explain “Surge” in case of compressor & also explain control scheme to control it. [8]

b) Explain pump types & centrifugal pump in detail [8]

OR

Q12)a) Discuss design aspect of water treatment plant. [8]

b) Explain compressor throttling. [8]



Total No. of Questions :12]

SEAT No. :

P1838

[4859]-317

[Total No. of Pages :3

**B.E (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2008 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain the role of each layer in “Automation Pyramid”. [10]
b) Explain the general objectives of Plant Automation. [8]

OR

- Q2)** a) What are the User Requirement Specifications for any automation project?
Explain with suitable example. [10]
b) Compare the PLC and SCADA on the basis of performance criteria.[8]
- Q3)** a) Explain OSI/ISO reference model in communication system. [8]
b) Explain HART Communication layers with respect to OSI/ISO reference model. [8]

OR

- Q4)** a) Explain MODBUS Protocol. [8]
b) Write short note on ControlNet and DeviceNet. [8]

P.T.O.

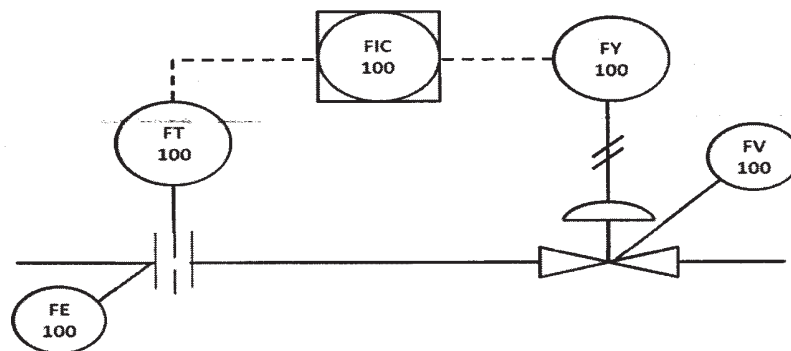
- Q5) a)** Explain with example function block diagram and sequential function chart in PLC programming. [8]
- b) With the help of any example explain G-Code in CNC machine. [8]

OR

- Q6) a)** Explain the PLC Programming methods as per IEC 61131-3. [8]
- b) Explain basic principle and working of CNC machine. [8]

SECTION - II

- Q7) a)** Write a program in DCS system (Any make) using FBD programming method to control the loop shown in figure below. Write the different steps involved in the configuration of function blocks. [10]



- b) List and explain the basic functions of DCS system. [8]

OR

- Q8) a)** Explain the architecture of DCS in detail. [10]

- b) Explain the various function blocks in DCS. [8]

- Q9) a)** Explain the User access management system in any DCS system. [8]

- b) Explain how alarms are classified and prioritized in any DCS system. [8]

OR

Q10) Explain in brief related to DCS system: **[16]**

- a) Database Management System.
- b) Data Communication Links.

Q11)a) Explain Safety Integrity Level (SIL). **[8]**

- b) Explain the importance of Hazard and Operability study (HaZOP). **[8]**

OR

Q12)a) Explain IEC61511 standard for functional safety. **[8]**

- b) What are the different safety architectures? **[8]**

EEE

Total No. of Questions :12]

SEAT No. :

P1839

[4859]-318

[Total No. of Pages :3

B.E. (Instrumentation and Control)
a-ADVANCED BIOMEDICAL INSTRUMENTATION
(2008 Course) (Elective - III) (Semester - II) (406269)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the functioning of cardioverter with a neat diagram. Why it is necessary to apply defibrillator shock in synchronization with ECG? [8]
- b) Draw and explain the Heart Lung Machine with a suitable diagram. [8]

OR

- Q2)** a) It is required to set up an ICU of 8 beds. Elaborate the implementation plans. [8]
- b) How the pacemakers are classified? Explain any one of them in detail with the help of a block diagram. [8]
- Q3)** a) Describe the Coulter Counter used for blood cell counting. How this method can be used for differential cell counting. [8]
- b) With the help of a diagram describe Health Level 7 Protocol used in biotelemetry. [8]

OR

P.T.O.

- Q4)** a) Describe frequency division multiplexing used in Telemetry. What are the precautions to be taken while implementing this method. [8]
- b) Write a short note on 'Electrophoresis'. [8]
- Q5)** a) i) State basic principle of Xray generation. [2]
- ii) Draw and explain in detail the Xray tube. [5]
- iii) Which materials are used for anode and why? [3]
- b) Draw and explain the block diagram of CT scanner. [8]

OR

- Q6)** a) i) Define Hounsfield Number. [2]
- ii) Specify the values of HU for different body elements. [4]
- iii) How HU is used during Image Reconstruction. [4]
- b) Which blocks are used in Xray signal conditioning and how do they help in quality improvement of Xray image. [8]

SECTION - II

- Q7)** a) i) What are the advantages of ultrasound in medical imaging. [4]
- ii) Express ultrasound velocity in terms of density and compressibility. How does it influence ultrasound imaging. [4]
- b) With the help of a neat diagram, describe the rectilinear scanner used for radionuclide imaging. [8]

OR

- Q8)** a) i) Define T1, T2 and FID related to MRI Instrumentation. [6]
- ii) What useful information is obtained from these parameters. [2]
- b) Explain A scan of Ultrasound Imaging along with its application. [8]

- Q9)** a) What are the different methods of Diathermy. Explain any one method in detail. [8]
- b) Describe Endoscope with the help of a block diagram. [8]

OR

- Q10)**a) Describe various applications of Laser in Dermatology. [8]
- b) What are the effects that can be observed when laser interacts with tissues. [8]

- Q11)**a) i) Compare hemodialysis and Peritoneal Dialysis. [4]
- ii) Describe various controls on dialysate side in Hemodialysis machine. [6]
- b) i) Define orthotic and prosthetic devices. [2]
- ii) Give suitable examples related to eye, ear and kidneys. [6]

OR

- Q12)**a) Discuss various types and materials used for Wheelchair. [8]
- b) i) What is the principle of Electromagnetic type of Lithotripsy. [4]
- ii) How focussing is achieved in that? [4]
- iii) What is the role of Xray imaging in Lithotripsy? [2]

EEE

Total No. of Questions :12]

SEAT No. :

P1840

[4859]-319

[Total No. of Pages :3

B.E. (Instrumentation and Control)

b: FIBER OPTIC INSTRUMENTATION

(2008 Course) (Elective - III) (Semester - II) (406269)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain total internal reflections on optical fibers with neat ray diagram. Also, explain the terms numerical aperture and acceptance angle. [8]
- b) Explain the single mode and multi-mode optical fibers. [8]

OR

- Q2)** a) Explain the classification of optical fibers in detail. [8]
- b) Explain the transmission of light in optical fiber with respect to evanescent field and mode coupling. [8]

Q3) Explain following losses in optical fiber transmission in detail:

- a) Alignment, connection losses [8]
- b) Attenuation and dispersion losses [8]

OR

- Q4)** Explain the principle and operation of OTDR with neat diagram. What is the application of OTDR? [16]

P.T.O.

- Q5)** a) List out the detectors in optical fibers and compare it. [9]
b) Describe the construction and selection guidelines of LED in optical fibers. [9]

OR

- Q6)** a) Describe what is meant by the fusion splicing of optical fibers. Discuss the advantages and drawbacks of this jointing technique. [9]
b) Describe in detail a common technique for achieving a butt jointed fiber connector. [9]

SECTION - II

- Q7)** a) Explain how the fiber optic sensors are classified. List the various techniques of sensing which is based on intensity modulation. [9]
b) Describe Intensity Modulated Optical Sensors with neat diagram. [9]

OR

- Q8)** a) What are the advantages and drawbacks of Optical Fiber Sensors? [9]
b) Explain encoding based position sensors with diagram. [9]

Q9) Explain following with diagram:

- a) Distributed optical fiber sensing [8]
b) Fiber grating sensing [8]

OR

Q10) Write short notes on:

- a) Fiber grating technology [8]
b) Fiber Bragg grating interrogations [8]

Q11) Explain the applications of following in fiber optic sensing in detail:

a) Silicon laser amplifier [8]

b) Integrated optics [8]

OR

Q12) Write short notes on:

a) Directional coupler and Beam splitter [10]

b) Integrated optics [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P1692

[4859]-32

[Total No. of Pages :4

B.E. (Mechanical)
CAD/CAM & AUTOMATION
(2008 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator to allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Neat diagrams must be drawn whenever necessary.*

SECTION-I

- Q1)** a) With the example of mid point transformation of a line, prove that geometric transformations are point based. [8]
- b) Explain with suitable sketch orthographic, isometric and perspective projections. [10]

OR

- Q2)** a) A Triangle PQR with vertices p(0,0), Q(3.5,0) and R(2,3) is translated through 4 and 2 units along x and y directions respectively. Then it is rotated about new position of 'R' by 70° in counter clockwise direction. Find concatenated matrix and final position of triangle. [10]
- b) Derive transformation matrix for reflection about an axis and plane. [8]

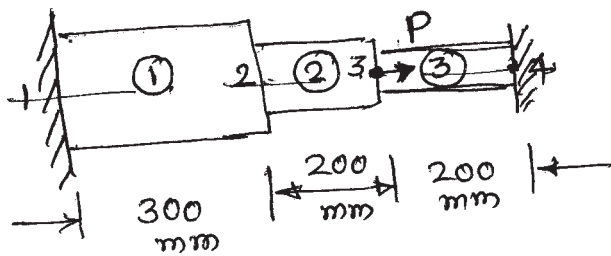
- Q3)** a) Discuss parametric modeling of Beta-spline curve. State disadvantages of Bezier curve. [8]
- b) Explain the concept of feature based modeling in detail. [8]

OR

- Q4)** a) Explain C^0 , C^1 and C^2 continuity with suitable example. [8]
- b) Explain in detail boundary representation. [8]

P.T.O.

- Q5) a) Consider a 3 stepped bar as shown in fig.1. with an axial load of $P=400\text{kN}$. find nodal displacements & stresses in each elements. [10]



$$A_1=2400 \text{ mm}^2 \quad A_2=1800 \text{ mm}^2 \quad A_3=1200 \text{ mm}^2$$

$$E_1=70 \times 10^9 \text{ N/m}^2 \quad E_2=200 \times 10^9 \text{ N/m}^2 \quad E_3=70 \times 10^9 \text{ N/m}^2$$

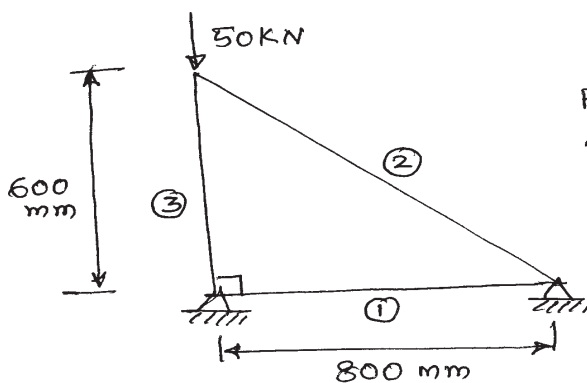
Fig.1.Q.5(a)

- b) Explain galerkin's method. [6]

OR

- Q6) a) A three truss bar element shown in fig.2. Determine [10]

- Element stiffness matrix.
- Global stiffness matrix.
- Nodal displacement.
- Stresses in each element.
- Reactions.



$$E_1=E_2=E_3=2 \times 10^5 \text{ N/mm}^2$$

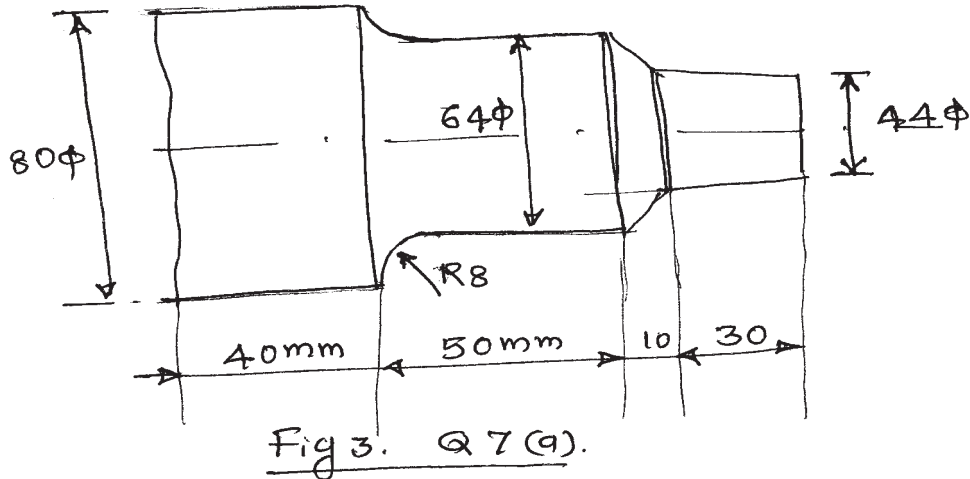
$$A_1=A_2=A_3=100 \text{ mm}^2$$

Fig. 2 Q6(a)

- b) Explain Rayleigh Ritz method. [6]

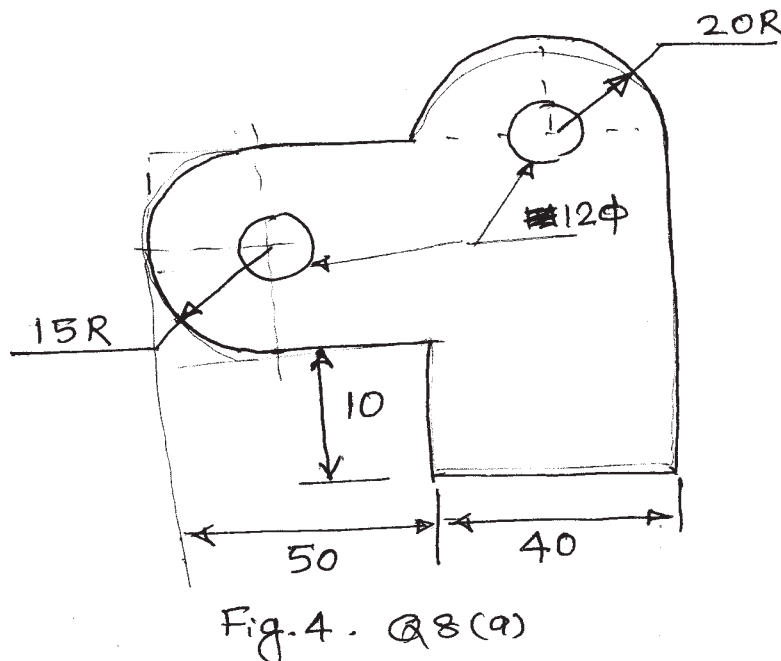
SECTION-II

- Q7) a) Explain the concept of CIM in detail. [8]
- b) Write a CNC part program for roughing and finishing of the turning component as shown in fig3. Raw material size $150 \times 80 \phi$. Assume suitable speed, feed and depth of cuts for mild steel materials. [10]



OR

- Q8) a) Write CNC part program for contouring and drilling of the component as shown in fig 4. by using G & M codes. Assume suitable data for speed, feed, and depth of cut for the aluminium blank size $100 \times 60 \text{ mm}^2$ [10]



- b) Explain the concept of DNC with neat sketch. [8]

- Q9) a)** Explain in detail flexible manufacturing system. With all its components. **[8]**
b) Describe automatic storage & Retrieval system. **[8]**

OR

- Q10)a)** Explain the concept of Group technology. **[8]**
b) Explain generative type of process Planning in detail. **[8]**

- Q11)a)** Explain different application areas of robot in detail. **[8]**
b) What is configuration of robot? Explain any two configurations in detail. **[8]**

OR

- Q12)a)** Explain various motion commands used in VAL programming language. **[8]**
b) Explain with neat sketch different types of Joints used in robots. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3539

[4859] - 320

[Total No. of Pages : 3

B.E. (Instrumentation & Control)
PROCESS MODELING AND OPTIMIZATION
(2003 & 2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions form section - I and three questions from section - II.*
- 2) *Answer to both sections should be written in separate answer books.*
- 3) *Use of non programmable calculator is allowed*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What do you mean by modeling? What is the necessity of modeling. How models are classified. [8]
- b) What is curve fitting? Why it require? Derive the equation for Least Square fitting for linear equation. [8]

OR

- Q2)** a) Explain the role of differential equations in model building. [8]
- b) Give suitable example of Mechanical first and second order system. Also derive mathematical model for same. [8]

- Q3)** a) Derive the mathematical equations which represent the dynamics of a Jacketed CSTR in which Component A and B are flow into the tank to produce component C at reaction rate of k. The reaction is assumed to be exothermic and cooling liquid is pass through jacket to maintain the reaction temperature which is assumed to be perfectly mixed. [12]
- b) What is evaporator? Give the different types of evaporators. [4]

OR

- Q4)** a) Develop mathematical model for Ideal binary distillation column having 8 trays. [8]
- b) Develop mathematical model for flash drum. [8]

P.T.O.

- Q5) a)** What is system identification? What is the purpose of system identification?
What is “Online” and “Off line” identification? [10]
- b) Explain the least square algorithm. [8]

OR

- Q6)** Write short notes on : [18]
- a) Sine Wave Testing for system identification.
- b) ATV identification.

SECTION - II

- Q7) a)** Determine the stability of a process with a diagonal feedback controller
as, $Gm = \begin{pmatrix} 3 & 0 \\ -1 & 2 \end{pmatrix}$, $B(s) = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$ [8]

- b) Explain [8]
- i) Niederlinski index
- ii) Resiliency
- iii) Interaction and decoupling

OR

- Q8) a)** Write a short note on Loci plot. [6]
- b) Calculate the RGA for the system with the steady state feedback gain matrix given as, [10]

$$K_p = \begin{pmatrix} 0.66 & -0.61 & -0.0049 \\ 1.11 & -2.36 & -0.012 \\ -34.68 & 46.2 & 0.87 \end{pmatrix}$$

- Q9) a)** What is optimization? Explain the necessity of optimization. [8]
- b) Explain Continuous and discontinuous function in detail along with suitable examples. [10]

OR

- Q10)a)** Minimize : $f(x) = x_1^3 - 3x_1 x_2 + 4$ [8]
- Subject to : $g_1(x) = 5x_1 + 2x_2 \geq 18$
- $h_1(x) = -2x_1^2 + x_2^2 + 5$

b) Is the following function convex, concave, both or neither. [6]

$$f(x) = \ln x_1 + \ln x_2$$

c) Explain the convex set. [4]

Q11)a) Explain the optimization using simplex method. [8]

b) Explain steepest descent method of optimization. [8]

OR

Q12) Write short notes on : [16]

a) Constrain and Unconstraint optimization techniques.

b) Quasi Newton method.



Total No. of Questions :12]

SEAT No. :

P1841

[4859]-321

[Total No. of Pages :3

**B.E (Instrumentation and Control)
d-BUILDING AUTOMATION - II
(2008 Course) (Elective - III) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Describe different ways of heat transfer with suitable examples. **[8]**
- b) On a measurable wet day, the outside air temperature is 5°C at 80% relative humidity. Bring that air into your building and heat it to 22°C. Draw Psychometric chart and find out relative humidity. Comment on the situation. **[10]**

OR

- Q2) a)** Explain the attributes that influence Human comfort. Explain sensible and latent heat loss with suitable examples. **[10]**
- b) Explain the design factors for choosing an air-conditioning system. **[8]**
- Q3) a)** Describe various steam traps of steam system with application. **[8]**
- b) Explain dual duct VAV. **[8]**

OR

P.T.O.

- Q4)** a) Explain Unitary equipments & its applications. [8]
b) Generally what are the different HVAC equipments which you will control in a commercial building? Explain any 2. [8]

- Q5)** a) Explain benefits of DDC with respect to following point [6]
i) Improved effectiveness
ii) Increased operating efficiency
iii) Increased energy efficiency
b) Give example of sensor/ output device for each type of signal (AI, AO, DI, DO). Explain each device. [10]

OR

- Q6)** a) What is BMS? Explain its components. [6]
b) Describe along with the application of different switches used in monitoring various signals and status of the equipments used in building automation. [10]

SECTION - II

- Q7)** a) Explain pros and cons of LON protocol. [8]
b) Explain serial transmission modes of modbus protocol. [8]

OR

- Q8)** a) Describe motor control center with block diagram. [8]
b) Explain system integration using BAC net and its challenges. [8]

- Q9)** a) Define ASHRAE. Draw ASHRAE symbols for the following: [8]
i) Chiller
ii) Cooling tower
iii) Unit heater
iv) Damper-opposed blade
v) Roof ventilator intake
vi) Humidifier
b) Explain the elements of green building. [8]

OR

Q10)a) What are the different energy management / conservation strategies?
Explain. [8]

b) Explain lighting control. [8]

Q11)a) Explain features and benefits of IBMS. [10]

b) During the life cycle of any project execution what are the various steps or milestones? [8]

OR

Q12)a) Name different verticals where Building Management System can be used.
Explain any two. [10]

b) What are the different building management systems which can be integrated and also list few of the advantages of integration? [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1842

[4859]-322

[Total No. of Pages :3

B.E. (Instrumentation & Control)

**a- INSTRUMENTATION IN AGRICULTURE
(2008 Course) (Semester-II) (Elective-IV)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any 3 questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume Suitable data if necessary.*

SECTION-I

Q1) a) Explain the necessity of Instrumentation in Agriculture engineering. [8]

b) Explain the concept of fine wire thermocouple. [8]

OR

Q2) a) Explain the various Hygrometers. [8]

b) Explain the concept of Mohr's circle of stress. [8]

Q3) a) Explain the instrumentation for Dairy plant. [9]

b) Explain the instrumentation for Batch process. [9]

OR

Q4) a) Explain the flow diagram of juice extraction process. [9]

b) Explain the flow diagram of Batch process. [9]

P.T.O.

- Q5) a)** Explain in short irrigation methods: [10]
- i) Micro irrigation system.
 - ii) Centre Pivot.
- b) Explain the design considerations in irrigation channels. [6]

OR

- Q6) a)** Explain concept of irrigation scheduling and Irrigation efficiencies. [8]
- b) Explain soil moisture measurement methods. [8]
- i) Gypsum block soil moisture sensor.
 - ii) Voltage based method.

SECTION-II

- Q7) a)** Explain irrigation control management of up stream & down stream control system. [8]
- b) Explain the role of PLC and SCADA for DAM parameters. [8]

OR

- Q8) a)** Explain instrumentation for green house control. [8]
- b) Explain humidity and temperature system for green house. List out the sensors for the same. [8]
- Q9) a)** Explain implementation of hydraulic control circuit use in harvesters cotton pickers. [8]
- b) Explain implementation of pneumatic control circuit use in harvesters cotton pickers. [8]

OR
2

Q10)a) Explain characteristics of Pump. [8]

b) Explain selection criteria for pump in detail. Explain installation of pump.[8]

Q11)Write short notes on :

a) Agrometrological instrumentation weather stations. [9]

b) Explain the infrared & UV bio sensor methods in agriculture. [9]

OR

Q12)a) Explain soil water content measurement using TDR. [9]

b) Explain the ground water occurrence confined & unconfined aquifers with aquifer properties.(any two properties) [9]



Total No. of Questions : 12]

SEAT No. :

P2041

[4859] - 323

[Total No. of Pages : 2

BE (Instrumentation & Control)
MICRO ELECTRO MECHANICAL SYSTEM
(2008 Pattern) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figure to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Why the MEMS devices are becoming so popular within short period of time. [8]

b) What is MEMS? What is role of sensors and actuators in MEMS. [8]

OR

Q2) a) Enlist commercially available MEMS sensors and name of the MEMS product Industries. [8]

b) Explain working of smart Bridge in civil engineering with neat sketch. Name sensors and their function used in Smart Bridge [8]

Q3) a) Explain working of a piezoresistive pressure sensor with neat diagram and the materials used for it. What are its application? [8]

b) Explain working of magnetic micro relay with diagram. [8]

OR

Q4) a) Explain working of Conductometric gas sensor with neat diagram. What are its applications. [8]

b) Explain working principle of Comb drive with neat diagram. [8]

Q5) a) How to prepare silicon wafer? [9]

b) What are the process-steps used in the fabrication of micro system? [9]

OR

Q6) Explain following micromachining Technique with neat diagram. [18]

a) Isotropic Etching

b) Anisotropic Etching

P.T.O.

SECTION- II

- Q7)** a) i) Define Hooks Law
ii) Young's modulus of elasticity [6]
b) Explain with neat sketch transversely deformable element: A Beam. [10]

OR

- Q8)** a) Define stress & strain [6]
b) Explain with neat sketch the simplest deformable element: A Bar [10]

- Q9)** a) Explain in detail the difference between. Finite Difference Method and Finite Element Method. [10]
b) List various fields of engineering where finite element method can be implemented [8]

OR

- Q10)** a) How Finite element Method is beneficial over analytical method [8]
b) Describe in detail the steps involved in solving structural problem using Finite Element Method. [10]

- Q11)** a) Explain working of PNP transistor with neat diagram. [8]
b) What is need of bridge balancing? What is bridge balance condition. [8]

OR

- Q12)** a) Draw and Explain Instrumentation amplifier? Also Mention its applications. [8]
b) What are different types of rectifier. Draw and explain full wave bridge rectifier. [8]



Total No. of Questions : 12]

SEAT No. :

P2007

[Total No. of Pages : 2

[4859]-324

B.E. (Instrumentation and Control)
DIGITAL IMAGE PROCESSING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

Q1) Explain in detail the key stages of digital image processing. **[16]**

OR

Q2) Discuss image resolution with suitable examples. **[16]**

Q3) Explain brightness adaption and discrimination with suitable examples. **[16]**

OR

Q4) Explain the following terms related to image : **[16]**
Brightness, Contrast, Gray Level and Histogram.

Q5) Obtain the 2D DFT of the following image: **[18]**

1 1 1
1 1 1
1 1 1

OR

Q6) Explain 2D DCT. Discuss its properties and applications. **[18]**

SECTION - II

Q7) Explain image enhancement of the image in time domain. **[18]**

P.T.O.

OR

Q8) Explain image enhancement in frequency domain with suitable example. **[18]**

Q9) What is image resoration. Explain its need and applications. **[16]**

OR

Q10) Explain winer filter and its digital implimenation. **[16]**

Q11) Explain canny operator with suitable applications. **[16]**

OR

Q12) Discuss edge detection in image with suitable application. **[16]**



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 2

P3224

[4859] - 325
B.E. (Semester - I)
BIOTECHNOLOGY
Bioseparation - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates :

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of Calculator is allowed.*
- 6) Assume Suitable data if necessary.*

SECTION - I

Q1) What is downstream Processing? Explain in detail problems and requirements of bio-product purification. **[16]**

OR

Q2) What are process design criteria for low volume high value products? Explain process development of any one product of same category. **[16]**

Q3) What is basic principle of spectroscopy? Describe quantitative spectrophotometric analysis with its instrumentation and applications. **[16]**

OR

Q4) Describe in details: **[16]**

- a) Spectroflurometry
- b) NMR

P.T.O.

- Q5)** Write notes in details on: (Any 2) (9 M Each) **[18]**
- a) Reverse Phase Chromatography
 - b) Gel Filtration Chromatography
 - c) Ion Exchange Chromatography
 - d) Hydrophobic Interaction Chromatography

SECTION - II

- Q6)** Write short notes on: (Any 2) (8 M Each) **[16]**
- a) Gas Chromatography
 - b) Liquid Chromatography
 - c) GC-MS
 - d) LC-MS

- Q7)** What are 'Hyphenated Techniques', explain it with one example. **[16]**

OR

- Q8)** What do you mean by SFE? Explain in detail technique with case study. **[16]**

- Q9)** Write and explain flow sheet of separation of following bioproducts (9 M each). **[18]**

- a) Peptide Antibiotics
- b) Butanol

OR

- Q10)** Write historical background of Beer production and elaborate on advancement of the production process. **[18]**

XXXX

Total No. of Questions : 12]

SEAT No. :

P3225

[Total No. of Pages : 4

[4859] - 326

B.E. (Biotechnology) (Semester - I)
INSTRUMENTATION AND PROCESS CONTROL
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Describe in brief principle, construction and working of Optical Pyrometer. [8]
- b) Name the instruments used for measurement of pressure. Describe any one in detail. [8]

OR

- Q2)** Explain in brief working principle of following instruments : [16]
- a) Electromagnetic flow meter
 - b) Radiation Pyrometer

- Q3)** a) For a first order system explain the effect of change in [4]
- i) Gain
 - ii) Time Constant
- b) Derive the response of typical first order system to a step input of magnitude A. Also explain the characteristics of the response obtained. [6]

P.T.O.

- c) A thermometer follows first order dynamics with time constant of 0.2 min. It is placed in temperature bath at 100°C and is allowed to reach steady state. It is suddenly transferred to another bath at 150°C at time $t = 0$ and is left there for 0.2 min. It is then returned to the original bath at 100°C. Calculate reading of the thermometer at $t = 6$ seconds and $t = 24$ seconds. [6]

OR

- Q4)** a) A thermometer having a time constant of 0.5 min is at a steady state temperature of 30°C. At time $t = 0$, the thermometer is placed in a temperature bath maintained at 90°C. Determine the time needed for the thermometer to read 80°C. [5]
- b) With the help of neat sketch explain the characteristic response of first order system to a sine input. [7]
- c) Write a short note on Peltier effect. [4]

- Q5)** a) For a second order system, with figure explain the effect of change in damping factor. [8]
- b) A step change of magnitude 4 is introduced in to a system having the transfer function. [10]

$$\frac{Y(S)}{X(S)} = \frac{10}{(S^2 + 1.6S + 4)}$$

Determine

- i) Percent Overshoot
- ii) Maximum value of $Y(t)$
- iii) Rise Time
- iv) Ultimate Value of $Y(t)$

OR

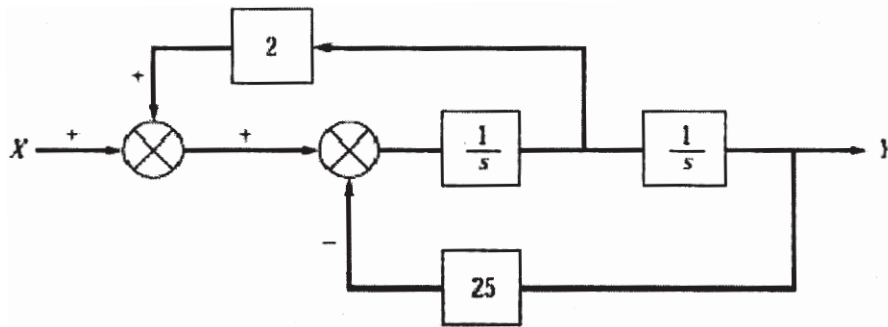
- Q6)** a) Derive the transfer function for a two tank interacting system. [8]
- b) For a second order under damped response, explain [10]
- i) Overshoot
 - ii) Decay Ratio
 - iii) Rise Time
 - iv) Response Time
 - v) Period of oscillation
 - vi) Transportation lag

SECTION - II

- Q7)** a) With the help of a block diagram of a control system, derive the transfer function for a Servo problem. [9]
- b) With the help of neat diagram, compare the control actions provided by different types of controllers. Enlist the advantages offered by each of these controllers. [9]

OR

- Q8)** a) For the control system shown below, determine the transfer function $Y(S) / X(S)$. [9]



- b) What is mean by feedback control? Enlist the major components of feedback control system. Explain in brief how a feedback system works? [9]
- Q9)** a) Draw the Bode Plot for the following system. [8]

$$G(s) = \frac{5}{(0.2S + 1)(0.5S + 1)}$$

- b) Write a note on Zeigler-Nichols tuning method. [8]

OR

- Q10)** a) Draw the Root locus for the following system. [8]

$$G(s) = \frac{K}{S(S^2 + 2S + 2)}$$

- b) Write a note on Cohen-Coon tuning method. [8]

Q11) a) With a suitable example, explain cascade control system. [8]

b) Write short note on [8]

i) Ratio control System

ii) Override control system

OR

Q12) Write short note on : [16]

a) Split Range Control

b) Auctioneering control system

c) Fuzzy Logic

d) Foam Controller



Total No. of Questions : 12]

SEAT No. :

P3226

[Total No. of Pages : 3

[4859] - 327

B.E. (Biotechnology) (Semester - I)
BIOPROCESS EQUIPMENT DESIGN
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or 2, Q3 or 4, Q5 or 6 from section-I and Q7 or 8, Q9 or 10, Q11 or 12 from section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Explain any one type of theories of elastic failure? [8]
b) A bolt carry an axial pull of 35 KN along with a transverse shear force of 15 KN. Find the diameter of bolt required according to maximum principal stress theory. Take elastic limit of material = 300 MPa $\mu = 0.3$ and Factor of safety is 3. [8]

OR

- Q2)** a) Write short note on purging. [8]
b) A Load of 3 KN to be raised is attached at the end of the steel wire is not to be exceed 150 MPa, what is the minimum diameter of wire required. [8]

- Q3)** a) Discuss in detail design procedure for cylindrical shell. [9]
b) Discuss the design of plain head, shallow head and hemispherical head with neat sketches. [9]

OR

P.T.O.

Q4) a) The inside diameter of cylinder is 20 cm and subjected to an internal pressure of 650 kg/cm². Allowable tensile stress of the material is 1500 Kg/cm². What should be the minimum thickness of the vessel? [9]

b) A high pressure vessel is to be operated at 110 MN/m². The inside diameter of vessel is 30 cm. Steel having yield stress 455 MN/m² is selected for fabrication. Estimate the wall thickness required by maximum shear stress theory with a factor of safety 1. [9]

Q5) a) Discuss the design consideration for jackets and coil used in process industry. [10]

b) Write short note on power curves in agitation. [6]

OR

Q6) a) A toluene is continuously nitrated to mononitrotoluene in a cast iron vessel, 1 meter in diameter, fitted with propeller agitator 0.3 m diameter, rotating at 2.0 Hz. The temperature is maintained at 320 K by circulating 0.499 kg/sec cooling water through a stainless steel coil 25 mm outer diameter and 22 mm inner diameter in the form helix 0.8 m in diameter. The conditions are such that the reacting material may be considered to have some physical properties as 75% H₂SO₄. If the mean water temperature is 290 K, what is the overall heat transfer coefficient for desired heat transfer co-efficient which having Reynolds number 2600. [10]

Properties of water

$$K = 0.59 \text{ W/mk}$$

$$C_p = 4180 \text{ J/kg.K}$$

$$\mu = 1.08 \times 10^{-3} \text{ NS/m}^2$$

$$\rho = 998 \text{ kg/m}^3$$

Properties of 75% H₂SO₄

$$K = 0.40 \text{ W/mk}$$

$$C_p = 1880 \text{ J/kg.K}$$

$$\mu = 6.5 \times 10^{-3} \text{ NS/m}^2 \text{ at } 310\text{K}$$

$$\rho = 1666 \text{ kg/m}^3$$

$$\mu_s = 8.6 \times 10^{-3} \text{ NS/m}^2$$

Thermal conductivity of stainless steel is 15.9 W/mk. Dirt resistance at inside and outside surface are 0.0002 & 0.0004 m²K/w.

b) Discuss various flow patterns in agitated vessels. [6]

SECTION - II

- Q7)** a) Describe the procedure for design of shell and tube heat exchanger. [8]
b) Discuss about Codes and Standards and various types of heat exchanger. [8]

OR

- Q8)** a) What are the different types of heat exchanger? Discuss about Codes and Standards for heat exchanger. [10]
b) Explain the procedure with equations to calculate the tube side heat transfer coefficient. [6]

- Q9)** a) Write Short note on AIChE method for calculation of plate efficiency. [8]
b) Define Murphree plate, Overall plate (column) efficiency. [8]

OR

- Q10)** a) Write short note on Smoker equation. [8]
b) Explain design variables in distillation. [8]

- Q11)** a) Write short note on Tangential Flow Filtration (TFF). [10]
b) Write short note on: Commissioning and validation of filter. [8]

OR

- Q12)** Discuss on : [18]
a) Downstream processing operation used in fermentation process.
b) High performance thin layer chromatography.



Total No. of Questions : 12]

SEAT No. :

P3640

[Total No. of Pages : 2

[4859]-328

B.E. (Biotechnology) (Semester - I)
ENVIRONMENTAL BIOTECHNOLOGY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answer three questions from Section I and three questions from Section II.*
- 3) Answers to the two sections should be written in separate books.*
- 4) Neat diagrams must be drawn wherever necessary.*
- 5) Figures to the right indicate full marks.*
- 6) Assume suitable data, if necessary.*

SECTION - I

Q1) Describe in detail about physical and chemical properties of waste water. **[18]**

OR

Q2) Enlist the water quality standards mentioned by ICMR and WHO. **[18]**

Q3) Draw a schematic and describe in detail about working principle of : **[16]**

- a) Trickling filters.
- b) Rotating biological contractors.

OR

Q4) Draw a schematic and describe in detail about working principle of : **[16]**

- a) Aerated lagoons.
- b) Photo catalytic reactors.

Q5) Write down the treatment strategies and disposal standards for : **[16]**

- a) Paper and Pulp industry.
- b) Sugar Industry.

OR

Q6) Write down the treatment strategies and disposal standard for textile and tannery industry. **[16]**

P.T.O.

SECTION - II

Q7) Describe the effects of air pollutants on human health, plants and animals. **[18]**

OR

Q8) Describe in detail about the following methods which are been used to control pollution. **[18]**

- a) Absorption.
- b) Adsorption.
- c) Combustion.

Q9) Enlist the different sources of solid waste and describe in detail about hospital waste management. **[16]**

OR

Q10) Describe the handling rules for hazardous waste and describe in detail about hospital waste management. **[16]**

Q11) Write a Short Note on : **[16]**

- a) Bioventing
- b) Biosparging.
- c) Suspended bioreactors.
- d) Fixed Biofilm reactors.

OR

Q12) Define bioremediation and describe in situ, ex situ, intrinsic and engineered bioremediation. **[16]**



Total No. of Questions : 12]

SEAT No. :

P1693

[4859]-33

[Total No. of Pages :5

**B.E.(Mechanical/Mech.S/W)
DYNAMICS OF MACHINERY
(2008Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule and electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain partial balancing of reciprocating engine. **[6]**
- b) The firing order of a six cylinder vertical four stroke inline engine is 1-4-2-6-3-5. The piston stroke is 80mm and the length of each connecting rod is 180 mm . The pitch distances between the cylinder centre lines are 80 mm, 80 mm, 120 mm, 80 mm and 80mm respectively. The reciprocating mass per cylinder is 1.2 kg and the engine speed is 2400 rpm. Determine the out of balance primary and secondary forces and couples on the engine taking a plane midway between the cylinder 3 and 4 as the reference plane. **[12]**

OR

- Q2)** a) Explain the direct and reverse crank method for determining unbalanced forces in radial engines. **[6]**
- b) The following data refers to a 90° two cylinder V-engine.
- | | |
|---|---------------|
| Mass of reciprocating part per cylinder | =3 kg. |
| Length of crank | = 100 mm |
| Length of connecting rod | = 400 mm |
| Speed of engine | = 2000 r.p.m. |
- Examine the engine for primary and secondary balancing, when the crank bisects the lines of cylinders.(Use direct and reverse crank method).[12]

P.T.O.

- Q3) a)** For the system shown in fig.1 if $K_1=2400\text{N/m}$ $K_2=2400\text{ N/m}$ $K_3=2400\text{N/m}$ and $K_4=K_5=500\text{ N/m}$ Find 'm' such that the system has a natural frequency 10 Hz. [8]

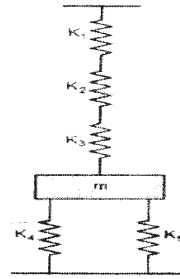


fig.1

- b)** A mass of 1 kg is supported on a spring of 9800 N/m and has a dashpot having damping coefficient of 6 N-sec/m. Find the damped natural frequency. Also find the logarithmic decrement and amplitude after 4 cycles, if the initial displacement is 5mm. [8]

OR

- Q4) a)** A door along with door closing system shown in fig. 2 has a moment of inertia of 25 kg-m² about the hinge axis. If the stiffness of torsional spring is 20 N-m/ rad, find the most suitable value of the damping coefficient. [8]

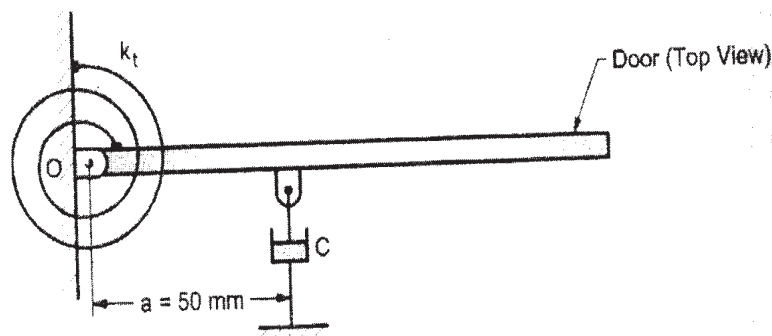


Fig.2

- b)** A mass of 500 kg is suspended with a spring. The system vibrates with a natural frequency of 3 rad/sec. If the initial amplitude is 24 mm and subsequent half amplitudes are 20 and 16 mm, determine the stiffness of spring and coulomb damping force. Also find the number of cycles corresponding to 50% reduction of its initial amplitude. [8]

- Q5) a)** Write short note on : **[8]**
- i) Forced vibration due to rotating unbalance.
 - ii) Forced vibration due to reciprocating unbalance.
- b) The body of a 600 kg vehicle is connected to the wheels through a suspension system that is modeled as a spring of stiffness 5×10^5 N/m parallel with a viscous damper of damping coefficient 3000Ns/m. The wheels are assumed to be rigid and follow the road contour which is approximated as a sine wave of amplitude 0.01 meter and a wavelength of 20 meters. If the vehicle travels at a constant speed of 60 Km/hr, what is the amplitude of the vehicle? What is the critical speed of the vehicle? **[8]**

OR

- Q6) a)** What are frequency response curves? State any four observations from these curves under different damping condition? **[8]**
- b) A centrifugal fan weighs 400N and has a rotating unbalance of 250 N-cm. The damper used has a damping factor of 0.2. Specify the stiffness of the spring used for mounting such that only 10% of the unbalanced force is transmitted to the floor. The fan is running at a constant speed of 800 r.p.m. **[8]**

SECTION-II

- Q7) a)** Explain the following term **[6]**
- i) Mode Shapes.
 - ii) Zero frequency.
 - iii) Node point.
- b) A shaft shown in fig. 3 carries two rotors A and B. The mass of rotor A is 300 kg with radius of gyration of 0.75 m, while the mass of rotor B is 500 kg with radius of gyration of 0.9 m
- i) Find the natural frequency of torsional vibration.

- ii) It is desired to have the node at mid section of the shaft of diameter 120 mm by changing the diameter of the portion of shaft having 90 mm diameter. What would be the new diameter? Assume $G=84 \times 10^9$ N/m². [12]

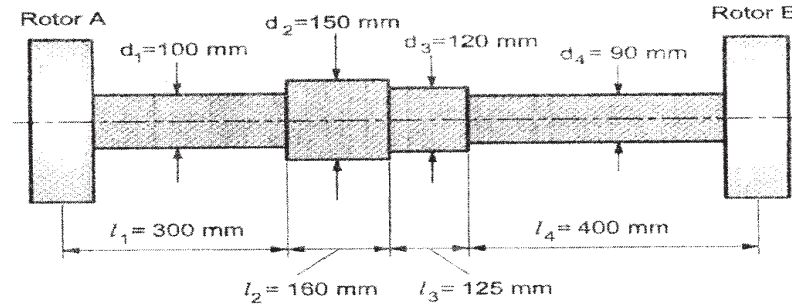


Fig 3.

OR

- Q8) a) Derive an expression for the total length of an equivalent shaft for geared system, neglecting inertia of gears? [6]

- b) A vertical shaft of 12 mm diameter rotates in sleeve bearings and a disc of mass 15 kg is mounted on the shaft at mid span. The distance between two bearings is 0.5 m. If the C.G. of rotor is 0.8 mm from the axis of the shaft, determine:

- i) The critical speed of rotation of the shaft: and
 ii) the speed range in which the bending stress in shaft will exceed 125 N/mm² Assume $E=2 \times 10^5$ N/mm². [12]

- Q9) a) Noise at the construction site is contributed by a few construction activities such as :

Piling work:104 dB, Scraper:93dB, Bulldozer:94dB, Mobile compressor:73 dB and Mechanical shovel:76dB on A-weighting networks. What is the overall sound pressure level. [6]

- b) The sound pressure level measured at 10 m from an automobile horn is 110 dB. Determine the sound pressure level at distance of i) 20 m ii) 80 m . Assume that the inverse square law holds good between intensity and distance. [4]

- c) Explain the working of condenser microphone. [6]

OR

- Q10)a)** Show that when the distance from point source is doubles the sound intensity level decreases by 6 dB. [6]
- b) The sound pressure level measured at a machine floor with a noisy machine operating nearby is 89.0 dB. When machine is turned off, the sound pressure level measured at the same location is 81.0 dB. What is sound pressure level due to machine only. [4]
- c) Explain any one type of sound enclosure. [6]
- Q11)a)** In a seismic instrument if mass, m is 0.1 kg, stiffness of spring, K is 1 N/mm and damping ratio, ξ is 0.5, Determine the amplitude of recorded motion if the motion of vibrating body is $3 \sin 200t$ (mm). [4]
- b) What do you mean by seismometer? Explain with the help of response curve of vibration measuring instrument how the relative amplitude recorded on dial become equal to the amplitude of Vibrating body? [8]
- c) Explain the working of stroboscope. [4]

OR

- Q12)a)** A fullarton tachometer is used to measure the frequency of vibration system. A mass of 0.02 kg is attached at the end of the reed so that its resonance is at a frequency of 50 Hz. The reed is of 50 mm long and 5 mm wide. Determine the thickness of reed. Take modulus of elasticity for reed material as 200×10^9 N/m². [4]
- b) What do you mean by condition monitoring of machines? Explain any three method of condition monitoring technique? [8]
- c) Explain passive Vibration isolation technique. [4]



Total No. of Questions : 12]

SEAT No. :

P3227

[Total No. of Pages : 2

[4859] - 330

B.E. (Biotechnology) (Semester - I)
BIO-THERAPEUTICS TECHNOLOGY
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or 2, Q3 or 4, Q5 or 6 from section I and Q7 or 8, Q9 or 10, Q11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*

SECTION - I

Q1) Give an overview of drug discovery and development process in context of Biotherapeutics. **[18]**

OR

Q2) What are the differences in synthetic drugs and biopharmaceuticals? Name five each Biotherapeutics, pharmaceuticals that were traditionally obtained from biological source materials and monoclonal antibodies. **[18]**

Q3) a) Enlist the criteria used for selection of suitable host for Biotherapeutic production. **[8]**

b) Explain various physical and chemical methods of gene delivery. **[8]**

OR

Q4) Give comparative account of E. coli, Yeast, Insect and mammalian hosts for production of Biotherapeutics with special reference to vectors used, glycosylation, downstream processing and economy. **[16]**

P.T.O.

Q5) Write a note on plants as a potential source of recombinant Biopharmaceuticals. Discuss the advantages and dis-advantages of the system. [16]

OR

Q6) a) Give schematic outline of cloning of cDNA. Briefly describe various expression vectors used for cDNA cloning. [8]

b) Discuss various methods used for transfer of recombinant genes in Plants. [8]

SECTION - II

Q7) Describe production of Biopharmaceutical using mammalian cell culture system. Write a note on cell banking system. [18]

OR

Q8) What are the important steps in analysis of final biopharmaceutical Products. [18]

Q9) Explain in detail degradation of biologically active protein. [16]

OR

Q10) Write short notes on any two : [16]

- a) Serine proteases,
- b) WFI,
- c) Monoclonal antibody.

Q11) Write a note on : [16]

- a) liposomes and
- b) QC tests for Biopharmaceuticals.

OR

Q12) Write a note on IPR, trademarks and trade secrets. Give appropriate examples. [16]



Total No. of Questions : 12]

SEAT No. :

P3641

[Total No. of Pages : 2

[4859]-331

B.E. (Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

SECTION - I

Q1) Write down the principle, advantages and disadvantages of the following :[18]

- a) Fuel cells.
- b) Geothermal Energy.
- c) Tidal energy.
- d) Photovoltaic.

OR

Q2) Write down the principle, advantages and disadvantages of the following:[18]

- a) Wind energy.
- b) Solar thermal energy.
- c) Hydrogen energy system.

Q3) What is Geothermal energy? Give the applications of geothermal energy. Enlist the general categories of geothermal resources and describe any two in details. [16]

OR

Q4) a) Explain in detail the flashed steam system for geothermal energy. [8]
b) Explain with neat sketch working of wind energy systems with main components. [8]

Q5) Explain the principle of conversion of solar energy into heat? What are the main components of flat plate solar collector, explain the function of each.[16]

P.T.O.

OR

- Q6)** Enumerate the different main applications of solar energy. What is the principle of solar photovoltaic power generation? What are the advantages and disadvantages of photovoltaic solar energy conversion? [16]

SECTION - II

- Q7)** What is microalgae? Describe in detail about microalgae biomass production by : [18]
- a) Raceway ponds and
 - b) Photobioreactors

OR

- Q8)** a) What are the types of photobioreactors? Explain with neat sketch working of any three photobioreactors, it's advantages and limitation. [14]
- b) Explain the advantages of microalgae as feed stock for biofuels. [4]
- Q9)** a) What is the role of detoxification? Explain one method each for physical, chemical and biological detoxification. [10]
- b) Explain concept of biorefinery and it's economics. [6]

OR

- Q10)** a) Explain any two challenges in lignocelluloses to ethanol production process. [8]
- b) Describe the common methods for alcohol production. [8]

- Q11)** Describe in detail about following biogas plant : [16]
- a) Continuous and batch types.
 - b) The dome and drum types.
 - c) Different variations in the drum type.

OR

- Q12)** a) What is anaerobic digestion? What are the factors affecting the biodigestion? Explain briefly. [8]
- b) List and explain briefly the techniques suggested for biogas production and maintenance. [8]



Total No. of Questions : 12]

SEAT No. :

P4431

[Total No. of Pages : 2

[4859]-332

FINAL YEAR B.TECH (Biotechnology)

BIOMATERIALS (Elective - II (b))

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answers books.*
- 2) *Answer Q 1 or 2, Q 3 or 4, Q 5 or 6 from section - I and Q 7 or Q 8, Q. 9 or 10, Q 11 or 12 from section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Discuss the biomedical application of smart materials. [8]
b) State and explain different processes for formation of biomaterials. [8]

OR

- Q2)** Write a note on: [16]
a) Importance and application of biomaterials.
b) Degradable medical implants

- Q3)** a) Discuss in detail fermentative production of polyesters like poly hydroxyalkonates [8]
b) Explain structure and properties of lactoyallatic, polycaprolactone. [8]

OR

- Q4)** a) Write a note on biomedical applications of three natural polysaccharides. [8]
b) Discuss about : i) Biopolymer ii) Chitin and Chitosan [8]

P.T.O.

- Q5) a)** Explain the in details following: [18]
i) Biomedical application of puiiulan
ii) Atomic forced microscopy for analysis of polymer structure.

OR

- Q6) a)** Enlist and explain various production methods of biodegradable polyesters from different microbial sources. [12]
b) State and discuss properties of bioceramics. [6]

SECTION - II

- Q7) a)** Enlist and explain various nanobiomaterials. [9]
b) Define biocatalyst. How it work for production of polymer and explain any one industrial application. [9]

OR

- Q8) a)** Give one case study showing the application of biocatalyst in biotransformation. [9]
b) Enlist and explain various membrane bioreactors. [9]

- Q9) a)** Explain in detail the process and application fermentative prodction of polyhydroxyalkanoates. [8]
b) Write an explanatory note on medical fibers and biotextiles. [8]

OR

- Q10)a)** Discuss in details biocomposites? And its advantages. [8]
b) Explain necessity and advantages of biocompatibility according to USP. [8]

- Q11)a)** Explain in detail on Tissue engineering scaffold. [8]
b) State and explain the various biomaterials which can be used for skin repair and bone plates. [8]

OR

- Q12)Discuss on:** [16]
a) Cardiovascular devices
b) Orthopedic biomaterials



Total No. of Questions : 12]

SEAT No. :

P3228

[Total No. of Pages : 2

[4859] - 333

B.E. (Biotechnology) (Semester - I)

STEM CELL BIOLOGY AND REGENERATIVE MEDICINE

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or 2, Q3 or 4, Q 5 or 6 from section I and Q 7 or 8, Q9 or 10, Q 11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) Explain - Stem cells are distinguished from other cell types. **[16]**

OR

Q2) a) Define the following : **[10]**

- | | |
|-----------------|--------------------------|
| i) Clonality | ii) Pluripotency |
| iii) Plasticity | iv) Transdifferentiation |

b) Diagrammatically explain the epidermal stem cells niche. **[6]**

Q3) a) Explain ChIP and its application in stem cell research. **[12]**

b) Write a short note on Gene targeting in mice. **[6]**

OR

Q4) a) Describe SCNT and give the advantages of SCNT. **[10]**

b) Define properties of an embryonic stem cells. **[8]**

P.T.O.

- Q5)** a) Summarize iPS technology. [10]
b) What is a “transcription factor?” What are the four transcription factors that are used in iPS cell creation? [6]

OR

- Q6)** a) Describe therapeutic cloning. [8]
b) Describe isolation and culture of the neural stem cell. [8]

SECTION - II

- Q7)** a) As per the SCCP, during in vitro cell culture, what are the parameters needed to be considered? [9]
b) Give the steps for Validation of the manufacturing process. [9]

OR

- Q8)** What is the aim and scope of the SCCPs document? What are the mandatory requirements for manufacture and usage of SCCPs. [18]

- Q9)** a) Describe the Working Cell Banks. [8]
b) Write a short note on use of adult tissue as source for Islet cells. [8]

OR

- Q10)** a) Cell replacement therapy has offered a novel and powerful medical technology for skin repair and regeneration. [8]
b) What is Self-regeneration? Explain Stem Cells in mammalian development. [8]

- Q11)** a) Explain- Using iPS Cells toward the Understanding of Parkinson’s Disease. [10]
b) Discuss the involvement of Stem Cells in the Wound Healing Process. [6]

OR

- Q12)** Discuss on : [16]
a) The effects of MSC on myocardial repair/regeneration and angiogenesis.
b) Inducing skin lineage commitment in stem cells
c) The use of cultured epithelial autografts (CEA) for epidermal regeneration.



Total No. of Questions : 12]

SEAT No. :

P3527

[Total No. of Pages :2

[4859]-334

B.E. (BIOTECHNOLOGY)
Bioprocess Modeling and Simulation
(2008 Pattern) (Semeter-II)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12,*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data, if necessary.*

SECTION-I

Q1) What is model building? Explain the four phases of model building with a neat sketch. **[18]**

OR

Q2) Define and explain: **[18]**

- a) Process Model
- b) Simulation of a model

Q3) Model Gravity flow system with proper assumptions and a neat sketch. **[16]**

OR

Q4) What are the factors affecting plant location and layout? Explain in detail. **[16]**

Q5) Write a brief note on “Boundary conditions”. Give suitable examples. What are the advantages of using boundary conditions? **[16]**

OR

Q6) a) State different types of thermal insulation for heating and cooling used in piping design. **[8]**

b) Explain the concept of water hammering in process design. **[8]**

P.T.O.

SECTION-II

Q7) Define Chemostat? How recycle stream affects the yield of bio product in Chemostat? Model a Chemostat with proper assumptions and neat sketch? **[18]**

OR

Q8) Write short notes on modeling of a continuous culture. **[18]**

Q9) Write short note on activated sludge systems. Model Suspended growth systems with proper diagram and assumptions. **[16]**

OR

Q10) Explain in detail the Biological treatment of waste water by using Biological film systems. **[16]**

Q11) Model a Multi component batch distillation column and prove that the system is critically specified. **[16]**

OR

Q12)a) Explain HAZOP studies. How HAZOP study is useful for controlling the process parameter. **[8]**

b) Write short note on IBR issue. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3229

[Total No. of Pages : 3

[4859] - 335

B.E. (BIOTECHNOLOGY) (Semester - II)

Plant Engineering and Project Costing

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or 2, Q3 or 4, Q 5 or 6 from section I and Q 7 or 8, Q9 or 10, Q11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Discuss the importance of pilot plant and laboratory data in plant design. [9]
- b) Describe the different types of process design aspects. [9]

OR

- Q2)** a) Discuss about various factors consider in techno economic feasibility study in plant design. [9]
- b) Discuss the scale up factors for packed column. [9]

- Q3)** a) Explain in detail the factors to be considered preparing a plant layout. [8]
- b) A project Engineer would like to choose a plant location for peniciline manufacturing unit. Please help him during selection of proper site. [8]

OR

P.T.O.

- Q4)** a) Explain plant safety operation and maintenance. [8]
 b) Explain the check list for safe plant design. [8]

- Q5)** a) Write short note on colour code of pipeline carrying utilities. [8]
 b) Write different steps of process piping design. [8]

OR

- Q6)** a) What are the different utilities required in process plant. Explain. [8]
 b) Draw utility diagram for batch reactor. [8]

SECTION - II

- Q7)** a) Discuss about CPM and PERT technique. [12]
 b) Explain the purpose of taxes. [6]

OR

- Q8)** a) A company manufacturing plant and equipment for biotechnology processing industry is quoting a tender. The delivery date is fixed. The project manager has listed down the activities in project as under: [12]

Sr.No.	Activity	Immediate Precedence Activity	Activity time in week
1	A	-	3
2	B	-	4
3	C	A	5
4	D	A	6
5	E	C	7
6	F	D	8
7	G	B	9
8	H	E,F,G	3
Develop the network. Calculate time estimates. Identify the critical path.			

- b) Discuss on project planning. [6]

- Q9)** List the various methods for raising finance. Explain each in brief. [16]

OR

- Q10)** a) Explain Discount factor and capital recovery factor. [8]
b) Explain the concept of Discounted cash flow with diagram. [8]

Q11) List the various methods for the determination of depreciation? Explain it. [16]

OR

- Q12)** a) Define and explain salvage value, Junk value, replacement value. [8]
b) Explain various methods of charging depreciation. [8]



Total No. of Questions : 12]

SEAT No. :

P3230

[Total No. of Pages : 2

[4859] - 336

B.E. (Biotechnology) (Semester - II)

FOOD BIOTECHNOLOGY

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) How does preservation reduce spoilage of foods? Enlist different mechanisms. Explain different methods used for preserving fruits and vegetables in industries. **[16]**

OR

Q2) Define food spoilage. What are the intrinsic and extrinsic factors affecting spoilage in foods? Explain in detail. **[16]**

Q3) Explain the following processes in detail : **[16]**
a) HTST pasteurisation
b) Microwave processing

OR

Q4) What is food irradiation? Explain the basic principle behind irradiation technique. Describe how irradiation techniques are used in food processing and preservation using examples. **[16]**

P.T.O.

- Q5)** Explain the principles and designing of : [18]
a) Refrigerator and
b) Freezer.

OR

- Q6)** Explain in detail thermal death kinetics of micro-organisms. [18]

SECTION - II

- Q7)** Which are the different polysaccharides used in food industries? Explain any three in detail. [18]

OR

- Q8)** Write a short note on microbial production of oils and fats. [18]

- Q9)** Which are the different enzymes used in food industry? Explain the role of enzymes in bakery industry. [16]

OR

- Q10)** Explain the role of enzymes in beer mashing and chill-proofing. [16]

- Q11)** What is food industrial waste? Explain in brief the solid waste treatment methods used in food industries. [16]

OR

- Q12)** How is food industrial waste classified? Explain in detail. [16]



Total No. of Questions :12]

SEAT No. :

P3518

[4859] -338

[Total No. of Pages : 2

B.E. (Biotechnology)

INTRODUCTION TO SYSTEMS BIOLOGY

(Elective-III) (2008 Pattern) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12,*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer to the two sections should be written in separate books.*

SECTION-I

Q1) Answer the following **[18]**

- a) How many ways can Transformation of information take place between RNA, DNA and Proteins? How are they classified? Give example if applicable
- b) Write the properties that provide a systems level understanding of a biological system.

OR

Q2) Answer the following **[18]**

- a) Write a note on History and methods Human Genome Project.
- b) Write a short note on the Molecular and the Systems paradigm.

Q3) Answer the following **[16]**

Explain capillary electrophoresis method in detail giving the principle, apparatus, procedure, advantage, disadvantages and uses.

OR

Q4) Answer the following **[16]**

What is comparative genomics? State its principle, Describe the application of comparative genomics in reconstruction of metabolic pathways.

Q5) Explain different Methods for Measuring Gene Expression. **[16]**

P.T.O.

OR

- Q6)** Define in short **[16]**
- a) RNA interference
 - b) siRNA
 - c) miRNA
 - d) Microarray

SECTION-II

- Q7)** Answer the following **[18]**
- a) What are environmental and dietary factors causing epigenetic changes?
 - b) Illustrate in detail about applications of epigenetic in treating diseases.

OR

- Q8)** What are the different types of epigenetic modifications? How is epigenetic changing approach towards cancer research? **[18]**

- Q9)** Answer the following **[16]**
- a) Explain Pharmacogenetics and Pharmacogenomics in detail.
 - b) Explain in detail Phase I and Phase II reactions

OR

- Q10)** What are the major components of Pharmacokinetics? Describe these in detail **[16]**

- Q11)** Answer the following **[16]**
- What are the steps in proteomics analysis? Write in brief about the technologies used in proteomics. Explain any one in detail.

OR

- Q12)** Write short notes on **[16]**
- a) MALDI TOF analyzers
 - b) Tandem mass Analyzer



Total No. of Questions : 12]

SEAT No. :

P1694

[4859]-34

[Total No. of Pages : 5

B.E. (Mechanical)

INDUSTRIAL FLUID POWER

(2008 Course) (Semester - I) (402043)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Draw a simple hydraulic circuit, showing all its essential components. State the functions of each component. [6]
- b) Classify the hydraulic fluids. What are the desirable properties of a hydraulic fluid? [6]
- c) What is the difference between a static & dynamic seal? Name four type of materials used for seal. [6]

OR

- Q2)** a) Write short note on schedule number of standard pipe. [4]
- b) Explain the purpose & construction of a good connecting fitting with neat sketch. [6]
- c) State the type of sources of contaminants in a hydraulic system. What is a bypass filter? State its advantages & disadvantages. [8]

- Q3)** a) What are the different accessories used in hydraulic systems? What are their functions? [6]
- b) Explain the applications of accumulator as: [10]
- i) Power saving device
 - ii) Hydraulic shock absorber device
 - iii) A leakage compensator.

OR

P.T.O.

- Q4)** a) Explain with sketch the operation of a balanced vane pump, also write down the various efficiency expressions for the pump. [8]
 b) Compare characteristics, advantages and applications of gear pumps, vane pumps, axial piston pumps and radial piston pumps. [8]

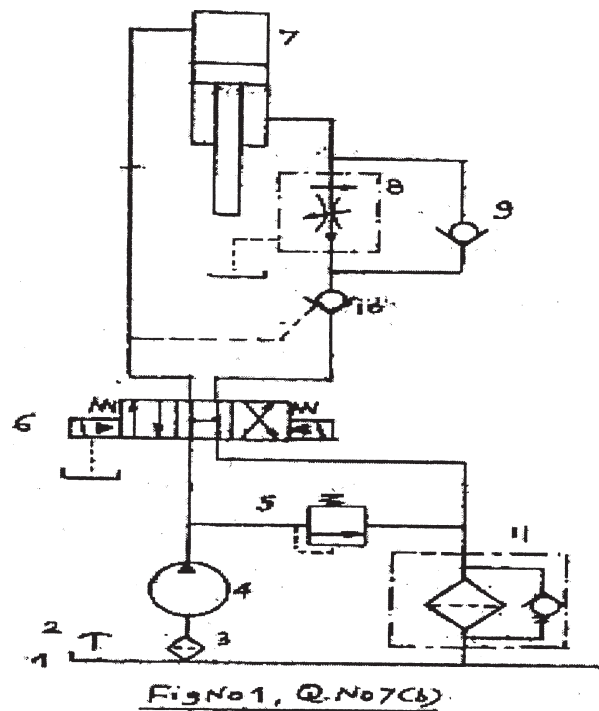
- Q5)** a) Classify direction control valves. [4]
 b) Draw a neat sketch and explain the working of open centre direction control valve. [6]
 c) Draw a neat sketch of a pressure compensated flow control valve and explain its working. [6]

OR

- Q6)** a) What are the advantages of solenoid control methods over mechanical control in direction control valves. [4]
 b) Explain the difference between direct and pilot operated pressure relief valve. [4]
 c) Explain with a neat sketch working of counter balance valve and draw a typical sketch showing its application. [8]

SECTION - II

- Q7)** a) Classify different hydraulic actuators. [6]
 b) Analyse the circuit shown in figure 1. [10]



OR

Q8) a) What is the purpose of providing cushioning in cylinders? With the help of a neat sketch, explain how it is achieved? [8]

b) Draw and explain a circuit for a riveting machine, whose speed has to be controlled. [8]

Q9) a) Compare characteristics of Hydraulic & Pneumatic systems. [4]

b) What is the purpose of quick exhaust valve in pneumatic circuits? [4]

c) Draw a typical circuit showing control of a double acting cylinder operated by a air pilot actuated direction control valve. The circuit uses another 3/2 direction control valve for ON-OFF operation. Explain working of the circuit. [8]

OR

Q10)a) What is the use of time delay valve in pneumatic systems? [4]

b) What is the purpose of providing Filter, Lubricator, mufflers and drier in pneumatic Systems? [4]

c) Explain 'AND' valve with a neat sketch. State its application with typical circuit. [8]

Q11)A hydraulic cylinder used to operate a machine has the following requirements. [18]

a) During the initial movement of 300 mm it has a load of 30 kN and it should complete this distance in about 6 seconds.

b) This is followed by a slow working stroke of 100 mm against a load of 50 kN which should be completed in 3 to 6 seconds. The time required is to be adjustable.

- c) The return motion of 400 mm is against a load of 40 kN which should be completed in about 7 seconds time.

Facility is required to hold the cylinder anywhere in between the entire stroke.

Solenoid operated valves are used in the circuit. A meter out circuit is used. Draw a circuit which will fulfill these requirements. Select different components you have used in the circuit from the given data. Mention ratings of the components in case it is not available in the given data.

OR

- Q12)a)** Explain with a neat sketch the working of 4 way 2 position lever operated direction control valve. **[6]**
- b) Draw a circuit for the following condition: The piston rod of a cylinder A is to advance only if a work piece is inserted in the work piece retainer, a guard has been lowered and operator presses the push button valve. Upon the release of the push button or if the guard is no longer in the lower position, the cylinder 'A' is to retract to the initial position. **[12]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S ₁	38
S ₂	76
S ₃	152

2. Pressure Gauge :

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R ₁	11.4	70
R ₂	19	210
R ₃	30.4	70
R ₄	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F ₁	70	0-4.1
F ₂	105	0-4.9
F ₃	105	0-16.3
F ₄	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia. (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600

Data sheet for Q 11

Total No. of Questions : 12]

SEAT No. :

P3231

[Total No. of Pages : 2

[4859] - 340

B.E. (BIOTECHNOLOGY) (Semester - II)

IPR, Bioethics and Regulations

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) Write in detail ICMR guidelines for ethics in biomedical research. [16]

OR

Q2) Explain the points with formats : [16]

- a) Consent form.
- b) Composition of ethics committee.
- c) Ethics at workplace.

Q3) Explain the case studies on ethics in life sciences and ethics in medicine. [16]

OR

Q4) Explain case studies in recombinant DNA, and ethics in food biotechnology. [16]

P.T.O.

Q5) What are Patents? Explain the concept with the help of following points: [18]

- a) Objects of patent law.
- b) Benefits of patenting.
- c) Remedies against infringement.
- d) Requirements of patentability.

OR

Q6) Explain patent application procedure in details in India. [18]

SECTION - II

Q7) What are Trademarks? Explain with the help of following points : [16]

- a) Domain name and trademark.
- b) Purpose of trademark.
- c) Requirements for registration for a trademark.

OR

Q8) What are copyrights? Explain with the help of following points : [16]

- a) assignment and transfer of copyright,
- b) copyright infringement,
- c) registration and piracy

Q9) What are the Regulatory requirements for Biotech product development? explain. [16]

OR

Q10) Explain about Current GMP in India. [16]

Q11) What are the Quality control requirements for Biotech product enlist and explain. [18]

OR

Q12) What do you mean by Clinical studies? Explain clinical research & clinical data management. [18]



Total No. of Questions :12]

SEAT No. :

P3520

[4859] -341

[Total No. of Pages : 2

Final Year B.Tech (Biotechnology)
INDUSTRIAL ORGANISATION AND MANAGEMENT
(Elective-IV) (2008 Pattern) (Semester-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss about partnership and joint stock company. **[8]**
b) State and explain advantages of cooperative enterprise. **[8]**

OR

- Q2)** Write a note on: **[16]**
a) Partnership deeds
b) Scientific management

- Q3)** a) Discuss the role of trade union of India. **[8]**
b) What is motivation? How it is important for industry prospective. **[8]**

OR

- Q4)** a) Write a note on performance appraisal. **[8]**
b) Discuss about **[8]**
i) Strike
ii) Lock out

- Q5)** a) Explain the following **[9]**
i) VED analysis
ii) SDE analysis
b) State and explain steps for reducing materials handling cost. **[9]**

P.T.O.

OR

- Q6)** a) Enlist and explain various functions of purchase department. [12]
b) State requirements of successful store keeping. [6]

SECTION-II

- Q7)** a) Enlist and explain various functions of sales department. [9]
b) Define market research. What are the different methods of market research? [9]

OR

- Q8)** a) Give one case study showing the importance of marketing management for growth of industrial organization. [9]
b) Enlist and explain various price fixation factors. [9]

- Q9)** a) Explain the following [8]
i) ISO system
ii) ISO 9001
b) Write an explanatory note on ISO 9000 family. [8]

OR

- Q10)** a) Discuss about Quality circles. [8]
b) Explain necessity and advantages of total quality management. [8]

- Q11)** a) Explain in detail on the payment of gratuity Act 1972. [8]
b) State and explain the various employee benefits under Employees state Insurance Act. [8]

OR

- Q12)** Discuss on: [16]
a) The concept of contract Act.
b) Factories Act.



Total No. of Questions : 11]

SEAT No. :

P1843

[4859]-342

[Total No. of Pages : 3

B.E. (Automobile)

AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING

(2008 Course) (Semester - I) (416488)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figures to the right side indicate full marks.*
- 2) *Use of steam tables, slide rule, electronic calculator, and psychrometric chart is allowed.*
- 3) *Assume suitable data if necessary.*
- 4) *Solve 6 questions 1 or 2,3 or 4,5 or 6,7 or 8,9 or 10,& 11 is compulsory.*

SECTION-I

- Q1)** a) Write down application & need of Refrigeration. [6]
b) Explain Bell Coleman cycle. [4]
c) The capacity of refrigerator is 450 TR when working between -15°C & 30°C . Find mass of ice produced at 0°C within 24 hours. When water is supplied at 20°C . Also find the minimum power required & heat rejected in condenser in kW. Assume the machine to be working on reverse carnot cycle. Take $C_{p_w} = 4.18 \text{ kJ/kg}^{\circ}\text{C}$ & latent heat of ice as 335 kJ/kg . [8]

OR

- Q2)** a) Explain cycle with p-h & T-s diagram. Derive an expression for COP. [8]
b) A heat pump is used for heating with design load at 4 Tonne. Water is available as heat source at 10°C & air is supplied to the building at 30°C . A 5°C differential is necessary between the condensing refrigerant & supply air & between the evaporating refrigerant & heat source. Determine
i) Ideal COP
ii) Power required to run the machine if its relative COP is 70%. [10]

- Q3)** a) Define refrigerant, Classification & Properties. [8]
b) Write various component of AC system. [8]

OR

- Q4)** a) Explain various types of Evaporators. [8]
b) Explain ozone depletion, Global warming issue & need of alternative refrigerant. [8]

P.T.O.

- Q5) a)** Explain various air distribution modes in vehicle Automotives. [8]
b) Draw & Explain comfort chart & describe comfort condition. [8]

OR

- Q6) a)** Mention types of Tonnes used in AC system. Explain centrifugal fan with neat sketch. [8]
b) Discuss types of ducts, its material & pressure losses. [8]

SECTION - II

- Q7) a)** Define following properties. [8]
Humidity
Relative Humidity
Dew point temperature
WBT & DBT
b) Calculate psychometric properties without using psychometric chart of moist air at 36°C & 20°C WBT. [8]

OR

- Q8) a)** At 30°C DBT & 10°C DPT of 800m³/ min air is mixed adiabatically with 300m³/min of air at 30°C DBT & 50% RH for mixed air find: [8]
i) Specific Humidity
ii) DBT
iii) WBT
iv) Density & specific enthalpy
b) Show following process on skeleton psychometric chart. [8]
i) Sensible heating & cooling
ii) Cooling & dehumidification
iii) Humidification & heating
iv) Adiabatic mixing of two streams

- Q9)** a) The room sensible heat & Latent heat load for an air conditioner space are 25kW & 5kW respectively. The room condition is 25°C DB & 50%RH. The outdoor condition is 40°C DB & 50% RH. The ventilation requirement is such that on mass flow rate basis 20% fresh air is introduced & 80% of supply air is recirculated. The bypass factor of cooling coil is 0.15. Determine
- i) Supply air flow
 - ii) Outer air sensible heat
 - iii) Outside air latent heat
 - iv) Grand total heat
 - v) ERSHE [8]
- b) Write note on [8]
- i) Sensors and actuators
 - ii) Pressure switching devices

OR

- Q10)** AC bus design for following parameters: Outside condition 40°C DB & 28°C WB. Inside condition 25°C DB & 50% RH. Solar heat gain through body =5.87 kW, Solar heat gain through glass =5.52kW, Occupant =25, SH gain per person =58kW, LH gain per person =60W, Internal lighting load =15 lamps of 100 Watt & 10 fluorescent tubes of 80 watt, SH gain other sources =11.6 kW, Infiltration air =15m³/min, if 25% fresh air & 75% recirculated air is mixed passed through the conditioner coil, Assume BF 0.2, Draw schematic diagram & calculate
- a) Amount of air required m³/hr
 - b) Dew point of temperature of coil
 - c) The condition of supply air
 - d) Capacity of conditioning. [16]

Q11) Write a note on any three. [18]

- a) Refrigerant recovery & recycling
- b) Leak detection
- c) Initial vehicle inspection
- d) Refrigerant storing
- e) Compressor servicing



Total No. of Questions : 12]

SEAT No. :

P1844

[Total No. of Pages :4

[4859]-343

**B.E. (Automobile Engg.)
Machine and Vehicle Dynamics
(Semester -I) (2008 pattern) (416489)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from section I and any three question from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Write a note on direct & Reverse crank method [7]
b) Explain the effect of partial balancing of reciprocating parts of two cylinder locomotive. [6]
c) What is static & dynamic balancing. [3]

OR

- Q2)** a) A three cylinder radial engine driven by common crank has the cylinder spaced at 120° . The stroke is 125mm, length of the connecting rod 225mm & the mass of the reciprocating parts per cylinder 2kg calculate primary & secondary forces at crank shaft speed of 1200 rpm. [9]
b) Explain analytical method to balance several masses rotating in the same planes. [7]

- Q3)** a) Define the terms [8]
1) Critical damping coefficient
2) Damping factor
3) Over damping
4) Critical damping
5) Logarithmic Decrement
6) Degrees of Decrement

P.T.O.

- b) A horizontal spring mass system with coulomb damping has a mass of 5kg attached to a spring of stiffness 980 N/M of the coefficient of friction of 0.025 calculate **[10]**
- i) the frequency of free oscillations
 - ii) the no. of cycles corresponding to 50% reduction in amplitude of initial amplitude is 5sm
 - iii) the time taken to achieve this reduction

OR

- Q4) a)** List the methods to find differential equation of motion of a vibratory system Derive an expression to find natural frequency & time period of torsional vibration using energy method **[8]**
- b) The measurement on mechanical vibrating system show that it has a mass of 8kg on that the spring can be combined to give an equivalent spring stiffness of 5.4N/mm. it the vibrating system has dashpot attached which has damping coefficient of 40Ns/m Determine **[10]**
- i) Critical damping coefficient
 - ii) Damping factor
 - iii) Logarithmic decrement
 - iv) Ratio of two consecutive amplitudes

- Q5) a)** Write a note on vibration isolation & transmissibility **[6]**
- b) A machine of 100kg mass is supported by total stiffness of 700kN/m & has an unbalanced rotating element which result in a disturbing force of 350N at a speed of 3000 rpm. Assuming damping factor of 0.20. Determine
- i) Amplitude of motion due to unbalance
 - ii) Transmissibility
 - iii) Transmitted force **[10]**

OR

- Q6) a)** Draw the characteristics curves for force vibration of single degree of freedom? And write significance for same [8]
- b) A vibratory body of mass 150kg supported on spring of total stiffness 1050kN/m has a rotating unbalance force of 525N at speed of 3000 rpm. If the damping factor is 0.3 Determine.
- The amplitude caused by unbalance
 - Phase angle
 - Transmissibility
 - Actual force transmitted. [8]

SECTION-II

- Q7) a)** Write mathematical expression for tractive force available for a motor vehicle in following case [8]
- solid rear axle with a non locking differential
 - solid rear axle with a locking differential
 - solid front drive axle with non locking differential
 - solid front drive axle with locking differential
- b) Explain the concept of Effective mass & Mass factor used in evaluation of acceleration performance of vehicle. [5]
- c) The curb weight of sedan without passenger or cargo are 1049.15kg on front axle & 599.64kg on the rear / off position of CG of or vehicle. [5]

OR

- Q8) a)** Draw tractive effort speed characteristics for a typical manual transmission write your interpretation based on same. [6]
- b) What are different Aerodynamic force acting on vehicle explain in brief. [6]
- c) Which parameter limit the braking performance of motor vehicle? Elaborate the same. [6]

Q9) a) Determine the pitch & bounce frequencies & location of oscillation centre for car with following characteristic [12]

Front spring stiffness =35kN/m

Rear spring stiffness =38kN/m

Distance bet front axle & CG = 1.4m

Distance bet Rear axle & CG =1500kg

Radius of Gyration $k=1.2m$

b) Draw a typical quarter car model used for vehicle ride analysis. [4]

OR

Q10)a) List Four vehicle ride vibration excitation source & elaboration source & elaborate any three in brief. [8]

b) List & elaborate Olley criteria used for ride engineering of vehicle. [8]

Q11)a) Explain the meaning of lateral acceleration gain / response & Draw characteristic curve for neutral steer, under steer & over steer. [8]

b) Explain advantage of ackerman steering Geometry over Devi's Steering Geometry. [8]

OR

Q12)a) A passenger car weights 20.02 kN & has a wheel base 279.4cm . The centre of gravity is 127cm behind the front axle if a pair Radial ply tyres, each of which has a cornering stiffness of 45.88 kN/ rad are installed in the front & a pair of bias ply tyre each of which has cornering stiffness 33.13kN/ rad are installed in the rear, determine whether the vehicle is over seer or under steer Also calculate characteristic or critical speed of vehicle. [10]

b) Draw a sketch showing bicycle modal during cornering. [6]



Total No. of Questions : 12]

SEAT No. :

P1845

[4859]-344

[Total No. of Pages : 4

B.E. (Automobile)

**AUTOMOTIVE SYSTEM DESIGN
(2008 Course) (Semester-I) (416490)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain aspects of Aesthetic. [6]
b) What is Ergonomics in design? [6]
c) Explain, design for natural tolerances. [6]

OR

- Q2)** a) Explain Johnson's method of optimum design. [6]
b) Write note on statistical analysis and mechanical reliability in design. [6]
c) Discuss: adequate & optimum in design. [6]

- Q3)** a) A single plate friction clutch of both sides effective has 300 mm outer diameter and 200 mm inner diameter. The coefficient of friction 0.3 and it runs at 2500 rpm. Find the power transmitted for uniform wear and uniform pressure distributions cases if allowable maximum pressure is 0.1 N/mm². [8]

- b) Answer the following:
- i) List desirable properties of lining material in clutch. [4]
 - ii) Why centrifugal clutch is more suitable for heavy duty applications? [4]

OR

P.T.O.

Q4) a) Derive an expression for torque transmission capacity for single plate friction clutch under uniform wear condition and uniform pressure condition. [8]

b) Derive expression for energy lost during engagement and energy dissipated due to clutch slip. [8]

Q5) a) A sliding type gear box with four forward and one reverse speed which is having following gear ratios, [10]

Gear ratio on top gear = 1:1

Gear ratio on third gear = 1.38:1

Gear ratio on second gear = 2.24:1

Gear ratio on first gear = 3.8:1

Gear ratio on reverse gear = 3.8:1

Assume counter shaft or layout shaft is half that of engine speed and smallest gear is not to have less than 15 teeth. Determine suitable number of teeth of different gears.

b) Explain with fig. sliding mesh gear box. [6]

OR

Q6) a) In a gear box the clutch shaft pinion has 14 teeth and low gear main shaft pinion 32 teeth. The pinions which gear with them on the lay shaft have 36 and 18 respectively. The gear axle ratio is 3.7 to 1 and radius of rear tyre 0.355 m. if the engine rpm is 2500, what is speed of the vehicle in km/hr? [8]

b) Explain bearing types, parameters considered for selection of bearing. [4]

c) Differentiate constant mesh and synchromesh gear box. [4]

SECTION-II

Q7) a) An engine develops 29.5 kW at 2000 rpm when the torque developed is maximum. The bottom gear ratio is 3:1 and back axle reduction is 4.5:1. The load on each driving axle is 7357.5 N when the car is fully loaded. Diameter of road wheel over the tyre is 0.71m and coefficient of adhesion between tyre and road is 0.6. If the permissible stress in the material of the shaft is not allowed to exceed 0.0220725 Mpa, find the diameter of the axle shaft. [10]

b) Explain with fig. universal joint and slip joint. [8]

OR

- Q8) a)** Discuss propeller shaft, draw relation for design torque of the shaft and list features of composite propeller shaft. **[10]**
- b) An automobile engine develops 28 kW at 1500 rpm, and its bottom gear ratio is 3.06. If a propeller shaft of 40mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 55×10^3 kPa for the MS. **[8]**
- Q9) a)** Explain the following: **[12]**
- i) Work done in braking.
 - ii) Importance of stopping distance in emergency braking.
 - iii) Brake balance.
 - iv) Braking efficiency.
 - v) Brake torque.
 - vi) Properties of friction lining in brakes.
- b) A vehicle having a mass of 1275 kg is brought to rest in a distance of 45m from a speed of 90 km/h by its disc brakes fitted to all four wheels. The effective diameter of the wheels is 0.7m. The disc units have two calipers fitted to each front wheel, and one to each rear wheel the caliper piston each have an area of 25.2 cm² (2 piston per caliper) and the brake pads are situated at a radius of 105 mm from the disc axis, of coefficient of friction is 0.4 then determine the brake fluid pressure in the system during the braking period. **[4]**

OR

- Q10)a)** Draw line diagram of hydraulic braking system and explain in detail. **[6]**
- b) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4 cross sectional area of master cylinder are 4 cm², cross sectional area of front piston 20 cm². Cross sectional area of the rear piston is 5 cm². Distance moved by effort is 1 cm. Calculate the following: **[10]**
- i) Front to rear brake ratio.
 - ii) Total force ratio.
 - iii) Distance moved by output.
 - iv) Cylinder movement ratio.
 - v) Total movement ratio.
 - vi) Percentage of front and rear braking.

- Q11)**a) Explain leaf spring mounting methods to the chassis. [4]
b) Design considerations of suspension system. [4]
c) Discuss forces on vehicle suspension system. [4]
d) Write a note on air springs. [4]

OR

- Q12)**a) A typical coil suspension spring has 10 effective coils of a mean diameter 125 mm and made out of wires of diameter 15 mm. The spring is designed to carry a maximum static load of 3531.6 N. Calculate the shear stress and the deflection under the above loading. If a maximum shear stress of 637650 kPa is allowable in the material, then what is the possible clearance in the spring? $G = 73575 \times 10^3$ kPa. [10]
b) Explain vehicle dynamics. [6]



Total No. of Questions : 10]

SEAT No. :

P1994

[Total No. of Pages : 2

[4859]-345

B.E. (Automobile) (Semester - I)

AUTOMOTIVE AERODYNAMICS AND STYLING

(2008 Pattern) (Elective I(a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw suitable diagrams wherever necessary.*

SECTION - I

Q1) a) Define the following with neat sketch. **[8]**

- i) Stream Lines
- ii) Path Lines
- iii) Streak Lines
- iv) Stream function

b) Explain briefly the types of flow? **[8]**

OR

Q2) Explain the following briefly : **[4 × 4 = 16]**

- a) Velocity potential
- b) Lift & Drag concept
- c) Convective & local acceleration
- d) Classification of Drag.

Q3) a) Explain Flow around circular cylinder. **[8]**

b) Explain development of Lift on Aerofoil. **[8]**

OR

Q4) a) Explain Lift & drag divergence. **[8]**

b) Explain characteristics of Swept wings. **[8]**

P.T.O.

Q5) Explain the optimization of car bodies for Low drag & Aerodynamics Development of car. **[18]**

SECTION - II

Q6) a) Explain the origin of forces & moments. **[8]**
b) Explain the Airflow pattern of Fast back, Square back, Hatch back?**[10]**

OR

Q7) Explain briefly the following : **[18]**
a) Effect of fastener.
b) Effect of gap configuration.
c) Introduction to CfD.
d) Boat Tailing Concept.

Q8) a) Describe Scale Models & full scale Wind tunnel? **[10]**
b) Explain flow visualization techniques. **[6]**

OR

Q9) a) Describe Wind noise measurements. **[8]**
b) Describe Climatic tunnels. **[8]**

Q10) Explain the following (Any four) : **[4 × 4 = 16]**
a) Front grill shapes.
b) Head light shapes.
c) Body styles.
d) Overall profiles.
e) Vehicle colour codes.



Total No. of Questions : 12

P1846

SEAT No. :

[Total No. of Pages :3

[4859]-347

B.E. (Automobile)

CAD/CAM and Automation

(2008 course) (Elective-I) (Semester-I)(416491)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) With an example, explain the significance of inverse transformation. [6]
b) Find the co-ordinates of figure bounded by (2,8) (8,8) and (8,2) when reflected along line L, whose Y-intercept is 4 and is inclined at 30° with x-axis. Plot the same on paper. [10]

OR

- Q2)** a) Explain different types of co-ordinates system used in CAD system. How are these co-ordinates mapped from one form to other? [8]
b) A triangle has co-ordinates A (1,2,3), B (4,3,4) and C (5,8,4) Write the transformation matrix and determine the co-ordinates of orthographic view (Front view and Top view only) [8]

- Q3)** a) Compare the Hermite Bi cubic surface, Bezier surface & B-Spline surface. [6]
b) Write a parametric equation of circle having centre at (3,3,0) and a radius of 3 unit. Calculate the co-ordinates of points on a circle, if it is divided in eight parts. [12]

OR

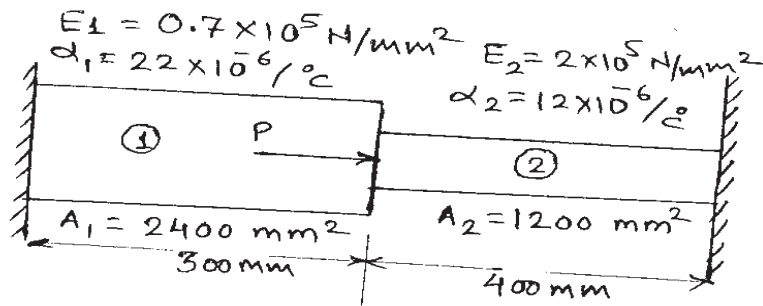
P.T.O.

Q4) Write short Note on,

- a) Feature base modeling (FBM) [6]
- b) Constructive solid geometry (CSG) [6]
- c) Synthetic curves [6]

Q5) a) What are the different steps involved in FEA? [4]

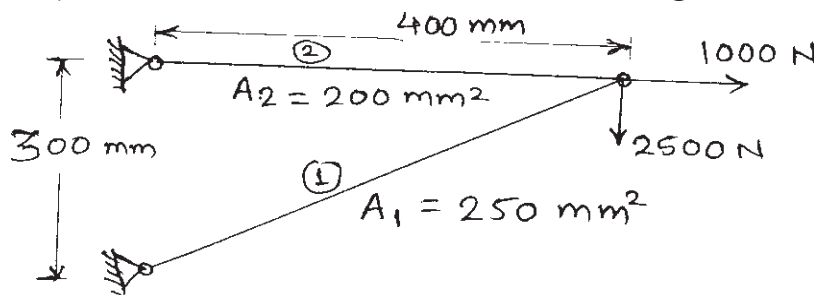
- b) An axial load $p=500 \times 10^3$ is applied at 25°C to the stepped bar as shown in fig .1. The temperature of bar is raised to 45°C Find Nodal displacement and elements stresses. [12]



OR

Q6) a) Derive a relation for determining the shape function for a linear ID element. [6]

- b) Using finite Element Method determine [10]
 - i) Nodal displacement at each node.
 - ii) Strss in each element. of the following truss members.



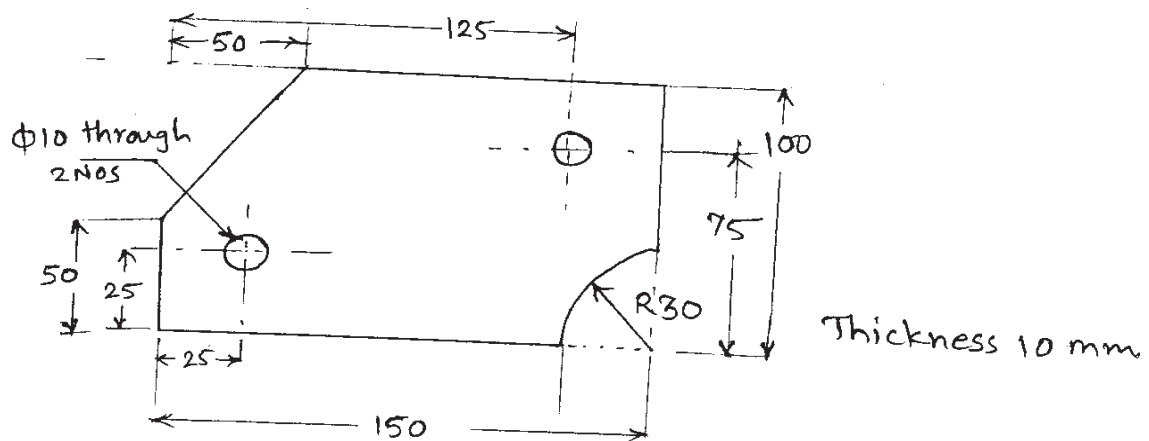
SECTION-II

Q7) a) Explain fixed zero and floating zero for CNC Machines [4]

b) Explain codes, [4]

- i) G00 ii) G02 iii) G71 iv) M03

- c) Write the manual part program for the component shown in fig 2. Assume suitable data. All dimension are in mm. [10]



OR

- Q8)** a) Explain tool length and cutter diameter compensation. [8]
 b) What is adaptive control? Explain in detail Adaptive control systems and its advantages. [10]

- Q9)** a) What are various work transfer mechanism? Explain Geneva mechanism with example. [8]
 b) Explain in details ASRS. [8]

OR

- Q10)** a) Define Automation? Compare the types of automation in detail. [8]
 b) Explain Group Technology. What are the merits and demerits of GT? [8]

- Q11)** a) Explain Robot configuration in detail with neat sketches. [8]
 b) Enlist the different type of robt joint. Explain any two in detail with neat sketch [8]

OR

- Q12)** a) What is End effector? What are the different types of end effectors used in industry? [8]
 b) What are the different types of sensors used in robots? Give its function. [8]

Total No. of Questions : 12]

SEAT No. :

P1995

[Total No. of Pages : 3

[4859]-347-A
B.E. (Automobile Engg.)
AUTOMOTIVE NVH
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the source of vibration and noise in Automobile. [8]
b) Explain the physiological effect of noise and vibration. [8]

OR

- Q2)** a) Write note on co-ordinate coupling. [8]
b) Displacement the plot for : [8]
i) Over damped System
ii) Under damped system

- Q3)** a) Explain the coulomb damping in detail. [8]
b) The spring of Automobile trailer is compressed 0.1 m under its own weight wave. Find the critical speed when the trailer is travelling over a road with a profile approximated by a sine wave of amplitude 0.08 m and a wavelength of 14 m. What will the amplitude of vibration at 60 km/hr? [8]

OR

- Q4)** a) Describe in detail untuned dry friction damper & draw its frequency response curve. [8]
b) How to control torsional oscillations amplitude in engine crank shaft? Describe its procedure in detail? [8]

P.T.O.

- Q5)** a) Write note on : **[9]**
i) Vibration isolation.
ii) Vibration absorber.
b) A 40 kg machine is supported by four springs each of stiffness 250 N/m. The rotor is unbalanced effect is equivalent to a mass of 5 kg located at 50 mm from the axis of rotation find the amplitude of vibration when the rotor rotates at 1000 rpm & 60 rpm assume damping co-efficient to be 0.15.**[9]**

OR

- Q6)** a) Differentiate in between tuned and untuned viscous dampers. **[9]**
b) Explain engine isolation in detail. **[9]**

SECTION - II

- Q7)** a) Derive the relation for sound pressure intensity and power level. **[8]**
b) Explain octave band analysis. **[4]**
c) Discuss noise as causes of stress. **[4]**

OR

- Q8)** a) Explain air born and structure born sound. **[8]**
b) Determine the approximated wavelength of 3.5 kHz frequency producing at room temp in. **[8]**
i) Water
ii) Glass
iii) Lead
iv) Steel

- Q9)** a) List various types of microphone & explain condenser microphone. **[8]**
b) An undamped seismic instrument is used to find the magnitude of vibration of a machine tool structure. It's give a reading of relative displacement of 0.8 micron meter, the natural frequency of the instruments is 5 Hz the machine tool structure is subject to an excitation at a frequency of 2 Hz. Find the magnitude of the acceleration of the vibration machine tool structure. **[10]**

OR

- Q10)** a) Explain noise generation and noise transmission in interior of the vehicle in details. **[10]**
b) Write a note on pass by drive noise measurement procedure in brief.**[8]**

Q11) a) Explain method of control noise of : [8]
i) Engine noise
ii) Intake and exhaust noise
iii) Interior noise

b) Write a note on : [8]
i) Isolation.
ii) Damping.
iii) Balancing.

OR

Q12) How one can apply noise control method. [16]

- a) At source.
- b) Along the path.
- c) At receiver.



Total No. of Questions : 10]

SEAT No. :

P3642

[Total No. of Pages : 2

[4859]-348

B.E. (Automobile Engg.) (Semester - I)

AUTOMOTIVE MATERIALS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any THREE questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain stress & strain relationship in material with graphical representation. [8]

b) Write a short note on composite materials used in Automobile Industry. [8]

OR

Q2) a) Explain in brief iron carbide diagram. [8]

b) How strain hardening improves material quality? Explain in brief. [8]

Q3) a) Write any 2 Heat treatments of steel and explain them in brief. [8]

b) Explain flame hardening with example of use. [8]

OR

Q4) a) Write any 2 surface Hardening Techniques. [8]

b) How corrosion will be avoided in automotive parts? [8]

Q5) Write a short note on criteria of selection of material for following component (any 3) : [18]

- a) Connecting Rod.
- b) Radiator panel.
- c) Gear.
- d) Cam.
- e) Gudgeon pin.

P.T.O.

SECTION - II

- Q6)** a) Write a process of Bag Moulding. [8]
b) Write any 4 fibers & their use in Automobile. [8]

OR

- Q7)** a) Explain rule of Mixtures in brief. [8]
b) How Filament winding takes place? [8]

- Q8)** a) Write a short note on matrix materials. [8]
b) How interlaminar fracture will be identify by X-radiography? [8]

OR

- Q9)** a) Write a note on thermosetting resins. [8]
b) How sear test will perform for composites? [8]

- Q10)** Write a short note on any 3 from following : [18]

- a) Bucky Papee.
- b) Carbon Fibre.
- c) Cross play & Angle play laminates.
- d) Analysis of laminated composites.
- e) Application of composite in defence.



Total No. of Questions : 11]

SEAT No. :

P1847

[4859]-349

[Total No. of Pages :2

B.E. (Automobile Engg.)

VEHICLE SAFETY

**(Semester-I) (2008 Course) (Part-I) (Elective-IIB)
(416492) (Theory)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Question number 1 is compulsory.*
- 2) *Figure to the right indicate full marks.*
- 3) *Assume suitable data, mention it clearly in you answer sheet.*
- 4) *Use of Non-programmable calculators is allowed.*

SECTION-I

- Q1)** a) Write the various characteristics of the vehicle structure. [6]
b) Why the safety systems are implemented in the automobiles? [6]
c) What is the importance of the Ergonomics in Automotive safety? [6]

- Q2)** a) Write the various types of impacts & Explain them in brief. [7]
b) Define/ Explain the following terms: [9]
i) Crumple Zone
ii) Crashworthiness
iii) Vehicle structure

OR

- Q3)** a) Explain the general requirements on the vehicle body structure. [8]
b) Why the testing of vehicle is carried out? State various types of testing in brief. [8]

- Q4)** a) Write the various location of controls in automotive vehicles. [8]
b) What is mean by Injury Thresholds? How the Injury Thresholds is determined? [8]

OR

P.T.O.

- Q5) a)** Why the dummies are necessary during the vehicle testing? Write the various types of dummies used in vehicle testing. [8]
- b) What is mean by Ergonomics? Why the Ergonomics are necessary? [8]

SECTION-II

- Q6) a)** Define Active safety systems? Enlist various active safety systems used in vehicle. Explain any four of them in brief. [12]
- b) What is pedestrian safety? Why the pedestrian safety is important? [6]

OR

- Q7) a)** Explain the various types of mirrors used in automobiles & state their locations. [10]
- b) Write the latest trends in traffic system for improved road safety. [8]

- Q8) a)** Write the necessity of Automotive lamps. Explain the various types of lamps used in Automotive vehicle. [8]
- b) How & why the testing of automotive lamp is carried out? [8]

OR

- Q9)a)** Explain the various recent trends in automotive lightening. [8]
- b) Write a short note on the following. [8]
- i) Rear position lamp
 - ii) Direction Indicator

- Q10)a)** Explain safety standard component of agriculture tractor. [8]
- b) Explain special requirements for transport vehicle that are driven on hills.[8]

OR

- Q11)a)** Explain the specifications that required for safety in tourist vehicle, (under rule 93) from the following point. [12]
- i) Structure
 - ii) Passenger entry & exit
 - iii) Driver entry & exit
 - iv) Ventilation
- b) Explain the responsibilities of Driver. [4]



Total No. of Questions : 12]

SEAT No. :

P1695

[4859]-35

[Total No. of Pages : 5

B.E. (Mechanical)

ENERGY AUDIT AND MANAGEMENT

(Elective - I) (2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** Write short note on: **[10]**
- i) Principles of energy management.
 - ii) Energy and environment.
- b) Explain current energy consumption pattern in global and Indian industry. **[8]**

OR

- Q2) a)** Write short notes on: **[10]**
- i) Energy security and reliability
 - ii) Need of Renewable and energy efficiency
- b) Discuss different aspects of Energy Policy and strategy in energy Conservation Systems. **[8]**

- Q3) a)** Write short note on: **[8]**
- i) Types of energy audit
 - ii) Energy Audit software
- b) List the various equipments required for energy audit purpose. Explain the following instruments used for energy audit with their applications. **[8]**
- i) Pitot tube
 - ii) Ultrasonic flow meter

OR

P.T.O.

- Q4) a)** Explain the aim of energy audit. Accurate measurement is very important in energy audit. Why? [8]
- b) Describe Energy conservation opportunities in boiler and Steam system. [8]

- Q5) a)** Explain following financial analysis methods. [8]
- i) Return on Investment
- ii) Simple payback period
- b) Calculate Net Present Value (NPV) of a project at a discount rate of 12% with an investment of Rs. 60,000 at the beginning of the first year, & saving of Rs. 28,000 & Rs. 41,000 at the end of the first & second year respectively. [8]

OR

- Q6) a)** How you will determine cost of electricity generated in case of steam power plant? [8]
- b) A sum of Rs. 40,000 is deposited in a bank at the beginning of a year. The bank pays 8% interest annually. How much money is in the bank Account at the end of the fifth year, if no money withdraw? [8]

SECTION - II

- Q7) a)** Explain Condensate and flash steam recovery system. [8]
- b) A brewery chilling system, ethylene glycol is used a secondary refrigerant. The designed capacity is 40 TR. A test was conducted to find out the operating capacity and energy performance ratios. The flow was measured by switching off the secondary pump and measuring the tank level difference in hot well. [8]

Measured data:

Temperature of ethylene glycol entering evaporator = (-) 1 °C

Temperature of ethylene glycol leaving evaporator = (-) 4 °C

Ethylene glycol flow rate = 13200 kg/hr

Evaporator ethylene glycol pressure drop (inlet to outlet) = 0.7 kg/cm²

Power input to compressor electrical power kW = 39.5 kw

Specific heat capacity of ethylene glycol = 2.34 kcal/kg °C

OR

Q8) a) What are the measures to be taken for efficient operation of HVAC Systems. [8]

b) Explain in brief steam trap and why it is important in thermal power plant. [8]

Q9) a) The lighting connected load for the small industry consisting of 140 fluorescent tubes of 55 W each with magnetic ballast. In first option, the magnetic ballast of Fluorescent tubes is replaced by electronic ballast and power consumption of same fluorescent tubes reduces to 40W. Calculate the simple payback period of above replacement if cost of electronic ballast is Rs. 110. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20W and cost of Rs. 450 each. Calculate simple payback period. Which energy saving option is better and why? Consider usage of 16 hours per day and an electrical tariff of Rs. 4 per kWh. [10]

b) What are the types of lamps used in lighting system? Write down their features with typical application. [8]

OR

Q10)a) Explain the following terms: [10]

i) Power Factor

ii) Maximum Demand

iii) Copper losses

iv) Stray losses

v) Luminous efficiency

b) What are different types of motor? Explain motor speed control system. [8]

Q11)a) What is the cogeneration? Describe technical option for cogeneration and write down advantage of cogeneration. [8]

b) Explain potential for waste-heat recovery in industry. [8]

OR

Q12)a) Explain in brief: [8]

i) CDM projects.

ii) Carbon credit calculation

b) Describe heat wheel used for waste heat recovery with neat sketch. [8]

10.0%

N	Single Payment		Equal Payment Series				Gradient Series		N
	Compound Amount Factor (F/P, I, N)	Present Worth Factor (P/F, I, N)	Compound Amount Factor (F/A, I, N)	Sinking Fund Factor (A/F, I, N)	Present Worth Factor (P/A, I, N)	Capital Recovery Factor (A/P, I, N)	Gradient Uniform Series (A/G, I, N)	Gradient Present Worth (P/G, I, N)	
1	1.1000	0.9091	1.0000	1.0000	0.9091	1.1000	0.0000	0.0000	1
2	1.2100	0.8264	2.1000	0.4762	1.7355	0.5762	0.4762	0.8264	2
3	1.3310	0.7513	3.3100	0.3021	2.4869	0.4021	0.9366	2.3291	3
4	1.4641	0.6830	4.6410	0.2155	3.1699	0.3155	1.3812	4.3781	4
5	1.6105	0.6209	6.1051	0.1638	3.7908	0.2638	1.8101	6.8618	5
6	1.7716	0.5645	7.7156	0.1296	4.3553	0.2296	2.2236	9.6842	6
7	1.9487	0.5132	9.4872	0.1054	4.8684	0.2054	2.6216	12.7631	7
8	2.1436	0.4665	11.4359	0.0874	5.3349	0.1874	3.0045	16.0287	8
9	2.3579	0.4241	13.5795	0.0736	5.7590	0.1736	3.3724	19.4215	9
10	2.5937	0.3855	15.9374	0.0627	6.1446	0.1627	3.7255	22.8913	10
11	2.8531	0.3505	18.5312	0.0540	6.4951	0.1540	4.0641	26.3963	11
12	3.1384	0.3186	21.3843	0.0468	6.8137	0.1468	4.3884	29.9012	12
13	3.4523	0.2897	24.5227	0.0408	7.1034	0.1406	4.6988	33.3772	13
14	3.7975	0.2633	27.9750	0.0357	7.3667	0.1357	4.9955	36.8005	14
15	4.1772	0.2394	31.7725	0.0315	7.6061	0.1315	5.2789	40.1520	15
16	4.5950	0.2176	35.9497	0.0278	7.8237	0.1278	5.5493	43.4164	16
17	5.0545	0.1978	40.5447	0.0247	8.0216	0.1247	5.8071	46.5819	17
18	5.5599	0.1799	45.5992	0.0219	8.2014	0.1219	6.0526	49.6395	18
19	6.1159	0.1635	51.1591	0.0195	8.3649	0.1195	6.2861	52.5827	19
20	6.7275	0.1486	57.2750	0.0175	8.5136	0.1175	6.5081	55.4089	20
21	7.4002	0.1351	64.0025	0.0156	8.6487	0.1156	6.7189	58.1095	21
22	8.1403	0.1228	71.4027	0.0140	8.7715	0.1140	6.9189	60.6893	22
23	8.9543	0.1117	79.5430	0.0126	8.8832	0.1126	7.1085	63.1462	23
24	9.8497	0.1015	88.4973	0.0113	8.9847	0.1113	7.2881	65.4813	24
25	10.8347	0.0923	98.3471	0.0102	9.0770	0.1102	7.4580	67.6964	25
26	11.9182	0.0839	109.1818	0.0092	9.1609	0.1092	7.6186	69.7910	26
27	13.1100	0.0763	121.0999	0.0083	9.2372	0.1083	7.7704	71.7773	27
28	14.4210	0.0693	134.2099	0.0075	9.3066	0.1075	7.9137	73.6495	28
29	15.8631	0.0630	148.6309	0.0067	9.3696	0.1067	8.0489	75.4146	29
30	17.4494	0.0573	164.4940	0.0061	9.4269	0.1061	8.1762	77.0766	30
31	19.1943	0.0521	181.9434	0.0055	9.4790	0.1055	8.2962	78.6395	31
32	21.1138	0.0474	201.1378	0.0050	9.5264	0.1050	8.4091	80.1078	32
33	23.2252	0.0431	222.2515	0.0045	9.5694	0.1045	8.5152	81.4856	33
34	25.5477	0.0391	245.4767	0.0041	9.6086	0.1041	8.6149	82.7773	34
35	28.1024	0.0356	271.0244	0.0037	9.6442	0.1037	8.7086	83.9872	35
40	45.2593	0.0221	442.5926	0.0023	9.7791	0.1023	9.0962	88.9325	40
45	72.8905	0.0137	718.9048	0.0014	9.8628	0.1014	9.3710	92.4544	45
50	117.3909	0.0085	1163.9085	0.0009	9.9148	0.1009	9.5704	94.8869	50
55	189.0591	0.0053	1880.5914	0.0005	9.9471	0.1005	9.7075	96.5619	55
60	304.4816	0.0033	3034.8164	0.0003	9.9672	0.1003	9.8023	97.7010	60
65	490.3707	0.0020	4893.7073	0.0002	9.9796	0.1002	9.8672	98.4705	65
70	789.7470	0.0013	7887.4696	0.0001	9.9873	0.1001	9.9113	98.9870	70
75	1271.8954	0.0008	12708.9537	0.0001	9.9921	0.1001	9.9410	99.3317	75
80	2048.4002	0.0005	20474.0021	0.0000	9.9951	0.1000	9.9609	99.5606	80
85	3298.9690	0.0003	32979.6903	0.0000	9.9970	0.1000	9.9742	99.7120	85
90	5313.0226	0.0002	53120.2261	0.0000	9.9981	0.1000	9.9831	99.8118	90
95	8556.6760	0.0001	85556.7605	0.0000	9.9988	0.1000	9.9889	99.8773	95
100	13780.6123	0.0001	137796.1234	0.0000	9.9993	0.1000	9.9927	99.9202	100

Total No. of Questions : 12]

SEAT No. :

P1848

[4859]-350

[Total No. of Pages :2

**B.E. (Automobile)
c-OFF ROAD VEHICLES
(2008 Course) (Semester - I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

SECTION-I

Q1) a) Which type of chassis used for off road vehicle and which section is selected normally to manufacture chassis? Justify. [9]

b) Which type of Transmission system used in off road vehicles? Justify. [9]

OR

Q2) a) Why multi-axles used in some off road vehicles, explain? [9]

b) Explain the history of off road vehicles. [9]

Q3) a) Explain different types of earth moving equipments with these application. [8]

b) Explain with neat sketch hydraulic dozer. [8]

OR

Q4) a) Explain the construction & working of dump truck with neat sketch. [8]

b) Which factors affecting the efficiency & output of tractors. [8]

Q5) a) Explain the construction & working of scrapper also write down the specification of any one scrapper. [8]

b) Where is the application of elevating grader write down the function & specification of it. [8]

OR

P.T.O.

- Q6) a)** What is the difference in revolving & stripper shovels give suitable example & specification of both. [8]
- b) How to decide the capacity of shovels? What are the different capacity shovels available in market? [8]

SECTION - II

- Q7) a)** Explain the special features of tanker and gun carrier. [8]
- b) Explain with neat sketch constructional detail of tanker. [8]

OR

- Q8) a)** Explain in detail the special features of transport vehicle. [8]
- b) What is meaning of power take off - explain in detail. [8]

- Q9) a)** Explain with sketch Brake system and actuation of OCDB. [8]
- b) What is body hoist & bucket operational hydraulics explain in detail. [8]

OR

- Q10) a)** Explain the term hydro-pneumatic suspension cylinders. [8]
- b) Explain design aspects of dumper body and loader bucket. [8]

- Q11) a)** Explain in detail term the Mobility Index (MI). [9]
- b) Define traction performance & factors affecting traction performance. [9]

OR

- Q12) a)** Explain the terms Vehicle Cone Index [VCI] & Rated Cone Index [RCI]. [9]
- b) Explain the following terms in relation to vehicle evaluation mobility-mobility number & Traction on wet soil. [9]



Total No. of Questions : 12]

SEAT No. :

P3643

[Total No. of Pages : 2

[4859]-351

B.E. (Automobile)

AUXILIARY ENGINE SYSTEM

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) What is mean by supercharging? Explain dynamic supercharging in details?[8]
b) Explain with neat sketch exhaust gas turbocharging. [8]

OR

- Q2)** a) Explain the effect of supercharging on the air consumption and power output from the engine and explain in detail the types and characteristic of compressor used in supercharger. [8]
b) Explain gas exchange process in case of supercharging. [8]

- Q3)** a) What is a pulse turbocharging? Explain it with neat diagram. [8]
b) What are the different applications of exhaust gas turbocharger? [8]

OR

- Q4)** a) Explain positive displacement mechanical supercharger. [8]
b) What is the difference between supercharger and turbocharger? Explain any one type of turbocharger in detail. [8]

- Q5)** a) What is the purpose of cooling the charge air? Explain its effect on engine performance. [10]
b) Explain in details effect of turbocharger on engine performance. [8]

P.T.O.

OR

- Q6)** a) Differentiate mechanical supercharger and exhaust supercharger with atleast eight points. [8]
b) What are the different aspect of turbocharging in case of passenger cars with gasoline engine. [10]

SECTION - II

- Q7)** a) Enlist the advantages of constant pressure turbocharging over the pulse turbocharging. [10]
b) Explain attitude derating in details. [8]

OR

- Q8)** a) What are the effect of supercharging on exhaust emissions of diesel and petrol engine? [10]
b) Explain torque characteristics of engine with exhaust turbocharger. [8]

- Q9)** a) Explain comprex supercharger. [8]
b) Explain bearing system in case of exhaust gas turbocharger. [8]

OR

- Q10)** a) What are the different types of material used for manufacturing the turbine of the supercharger. [8]
b) With the help of compression graph explain the various aspects related with compressor and it's impeller. [8]

- Q11)** a) Explain exhaust gas recirculation and its significance in reduction of vehicle emissions. [8]
b) What are the desired properties of engine coolants. [8]

OR

- Q12)** a) Which are the different aspects related with the designing of cooling air fan. [8]
b) Write different aspects of design of radiator. [8]



Total No. of Questions :12]

SEAT No. :

P1849

[4859]-352

[Total No. of Pages :3

B.E (Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Differentiate between conventional and non-conventional fuels. [6]
b) What do you mean by alternative fuels? Explain its need, advantages and application in an automobile. [10]

OR

- Q2)** a) Explain the term quality rating of SI & CI engine fuels. [6]
b) What is enthalpy of formation and enthalpy of combustion? [10]
- Q3)** a) Can we use ethanol as an alternative fuel for IC engine? Explain. [6]
b) Write a note on storage of hydrogen fuel. [6]
c) Write note on bio diesel. [6]

OR

- Q4)** a) What are the engine modifications required while using bio-diesel as fuel? [6]
b) Differentiate CNG & Diesel by its properties, advantages, disadvantages and applications. [6]
c) Explain the use of vegetable oil as an alternative fuel. [6]

P.T.O.

- Q5)** a) What are the types of synthetic fuel? Explain biomass to liquid (BTL) fuel. [8]
- b) Can we use water as fuel for vehicle? Explain. [8]

OR

- Q6)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [8]
- b) Write in detail about syngas. [8]

SECTION - II

- Q7)** a) Write down contents of SI engine emission. Enlist methods of reducing HC emission. [4]
- b) What are the causes of CO emission in SI engine? Give any two remedies. [4]
- c) Explain Positive Crankcase Ventilation system for reduction of UBHC emission. [8]

OR

- Q8)** a) What are the methods of exhaust after treatment explain any one. [6]
- b) What is the effects of design and operating variables on SI engine emission? [10]

Q9) Explain effect of design and operating parameters on CI engine emission. [16]

OR

- Q10)**a) Explain any one method of smoke measurement in detail. [8]
- b) How will you reduce the NO_x emission? Explain EGR system in detail. [8]

Q11) Write a note on:

- a) Emission inventory. [6]
- b) Ambient air quality monitoring. [6]
- c) Indian emission norms. [6]

OR

- Q12)**
- a) What are the effects of engine emission on human health and on environment? [9]
 - b) Enlist any nine remedies to reduce the engine emission with explanation. [9]

EEE

Total No. of Questions :12]

SEAT No. :

P1850

[4859]-353

[Total No. of Pages :3

B.E. (Automobile Engg.)
VEHICLE PERFORMANCE AND TESTING
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.*

SECTION - I

- Q1) a)** Write a short note on: **[10]**
- i) Deceleration
 - ii) Gradability
 - iii) Ride
 - iv) Life durability
 - v) HANS
- b) How EGR system improves vehicle performance? Explain with schematic diagram of EGR system. **[6]**

OR

- Q2) a)** Write a brief note on Lambda close loop control system with types of sensors. **[8]**
- b) Explain steering as a vehicular system with one suitable example. **[8]**
- Q3) a)** How epicyclic transmission is providing wide range of gear ratio? **[8]**
- b) What is the impact of differential & final drive unit on vehicle performance. **[8]**

OR

P.T.O.

- Q4)** a) If tyre of tractor will replaced by car tyre, what will be the impact on performance? [8]
b) Discuss in brief about “Use of torque convertor in automated vehicle”. [8]

Q5) Write a brief note on following terms [18]

- a) Coast down test
b) Fuel economy test on chassis Dynamometer
c) Proving ground

OR

- Q6)** a) Write any four test tracks in brief which will be used for testing of cross country vehicles. [10]
b) How free acceleration test helps to follow vehicle pollution norms. [8]

SECTION - II

- Q7)** a) ‘Electronic stability program improves vehicle performance & safety’ explain in brief. [8]
b) Describe particulate traps with its function & construction. [8]

OR

Q8) Explain following occupent safety systems in brief: [16]

- a) Collapsible steering
b) Parking assist system
c) Air bags
d) Seat belt

- Q9)** a) Explain crash testing dummies with hybrid III family. [10]
b) What is small overlap impact test? Describe with suitable example. [6]

OR

- Q10)**a) Explain any 3 types of crash test sensor. [10]
b) How vehicle to vehicle impact test & vehicle to wall impact test are different from each other? [6]

- Q11)**a) How engine noise will be reduced? [6]
b) 'In comfort of passenger, vibration reduction plays important role' explain in brief. [6]
c) How to perform battery testing with hydrometer. [6]

OR

- Q12)** Write a short note on following: [18]
a) Endurance test
b) Brake efficiency measurement
c) Wind noise

EEE

Total No. of Questions :12]

SEAT No. :

P1851

[4859]-357

[Total No. of Pages :3

B.E. (Automobile Engg.)

PRODUCT DEVELOPMENT AND COSTING

(2008 Course) (Elective - III D) (Semester - II) (416497)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answers to the two sections should be written in separate answer - books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

SECTION - I

- Q1) a)** Explain the front end process with block diagram. **[8]**
- b) Write a short note on AFM development process. **[8]**

OR

- Q2) a)** What are the objectives of product development organization? Explain in brief. **[8]**
- b) Explain the product planning process in detail. **[8]**
- Q3) a)** How to identify the customer needs? Explain in detail. **[8]**
- b) Explain the documentation process of interaction with customers. **[8]**

OR

- Q4) a)** Explain the importance of needs in the organization. **[6]**
- b) Explain the procedure of establishing the product specification & how to set the final specifications? **[10]**

P.T.O.

- Q5)** a) Explain the five step method to clarify the problem. [10]
b) Write a short note on following:
i) Concept classification tree [4]
ii) Concept combination table [4]

OR

- Q6)** a) What are the benefits of structured method? [6]
b) Explain the activity generation concept. [6]
c) Explain the benchmarking process of related products. [6]

SECTION - II

- Q7)** a) Write a short note on product development & costing. [8]
b) How to manage the trade-off between differentiation and commonality? [8]

OR

- Q8)** a) Explain the procedure of establishing the Architecture of the Chunk. [8]
b) Explain the types of modularity. [8]
Q9) a) How to assess the need & expenditure of industrial design. [10]
b) Write a short note on Ergonomic Needs, Aesthetic Needs in industrial design. [6]

OR

- Q10)** a) Explain the procedure of assessing the quality of industrial design. [8]
b) Write a short note on Design for Manufacturing (DFM). [8]

- Q11)** a) How to estimate the manufacturing costs, explain in brief. [8]
b) Explain the impact of DFM on development time & cost. [10]

OR

Q12) Write short note on the following:

- a) Qualitative Analysis. [6]
b) Quantitative Analysis. [6]
c) Economics analysis process. [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P1852

[4859]-358

[Total No. of Pages :3

B.E. (Auto Mobile)

**a-TRANSPORT MANAGEMENT & MOTOR INDUSTRY
(2008 Course) (Semester-II) (Elective-IV)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

SECTION-I

- Q1) a)** Define the terms. **[9]**
- i) Good vehicle.
 - ii) Public place.
 - iii) Transport place.
- b) State particulars that have to be collected for the purpose of preparing a accident report. **[9]**

OR

- Q2) a)** Detail out the responsibility of Driver in case of accident. **[9]**
- b) List out the document detail procedure for the licensing of driver and conductor. **[9]**
- Q3) a)** Describe the taxation and objective of taxation in detailed. **[6]**
- b) Give brief discussion on Taxes on motor vehicles. **[4]**
- c) Short note on : **[6]**
- i) One time tax on non transport vehicles.
 - ii) One time tax on transport vehicles.

OR

P.T.O.

- Q4)** a) Why road tax is laid on vehicles? [6]
b) Under what circumstances the motor vehicle tax is refundable? How do you get the refund. [6]
c) Explain the Taxation structure for passenger and goods transport vehicles. [4]

- Q5)** a) Give detail about insurance & type of insurance . [6]
b) Give detailed difference between Insurance and assurance. [4]
c) Detailed description about motor vehicle insurance. [6]

OR

- Q6)** a) Explain in detail accident claim procedure. [6]
b) What are the duties of surveyor and loss assessor. [6]
c) What is third party insurance? What are the advantages & disadvantages. [4]

SECTION-II

- Q7)** Attempt any three [18]
a) Passenger transport operation.
b) Classification of Transport operation.
c) Scheduling of transport operation.
d) Modes of Road transport.

OR

- Q8)** a) Give the details about theory of fares in passenger transport operation. [6]
b) How do you select a vehicle for a particular operation? [6]
c) What is the use of computer in passenger transport operation? [6]

- Q9)** a) Explain in brief good transport operation. [6]
b) Give function of good transport organization and also explain the structure. [6]
c) Describe the schedule structure of good transport organization. [4]

OR

Q10) Describe the following: [16]

- a) Management information system.
b) Storage and transportation of petroleum product.

Q11) Write a short note on (any two): [16]

- a) Control of traffic.
b) Advance techniques in traffic management.
c) Alternative fuel for vehicle.

OR

Q12) Describe in brief: [16]

- a) Global position system.
b) Traffic control in towns.



Total No. of Questions : 12]

P1996

[Total No. of Pages : 3

[4859] - 359

B.E. (Automobile) (Semester - II)

b:ENERGY ENGINEERING AND MANAGEMENT

(2008 Pattern) (Elective - IV)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of logarithmic tables, slide rule. electronic packet calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Unit - I

- Q1)** a) Write and explain global primary energy resources and energy consumption pattern. With green house effect. **[9]**
- b) Explain Indian energy policy and pricing. **[9]**

OR

- Q2)** Explain Term (ANY TWO) **[18]**
- a) Energy conservation act 2001
 - b) Energy use on Biodiversity
 - c) Energy needs for growing economy.

P.T.O.

Unit - II

- Q3)** a) Explain the term Renewable energy And also write - down solar energy with example in brief. [10]
b) Give detailed on wind energy with power generation technologis [6]

OR

- Q4)** a) Compare solar energy with Bio energy [6]
b) Give detail technology about Hydro electric power plant [6]
c) Explain Bio Energy with neat sketch and operation [4]

Unit - III

- Q5)** a) What is energy surveying and explain energy auditing. [4]
b) Write the Energy audit methodology with detailed audit phase. [6]
c) Give importance of energy conservation in Boiler [6]

OR

- Q6)** a) Explain waste heat recovery system in thermal utility (any one) [6]
b) What is energy balance and what is impact on environment? [10]

SECTION - II

Unit - IV

- Q7)** Attempt any Three [18]
a) Energy conservation is Furnace
b) Energy conservation in Chillers
c) Energy conservation in Cooling tower
d) Energy conservation in Heat Exchanger

OR

- Q8)** a) A centrifugal pump is pumping $85 \text{ m}^3/\text{hr}$ of water and pressure rise in the pump is 6 kg/cm^2 (gauge) If power drawn by motor is 25 kW. Find out the pump efficiency. Assume motor efficiency as 90% and water density as 998 kg/m^3 [10]
b) Explain with neat sketch steam turbine working and losses. [8]

Unit - V

- Q9)** a) Explain any five Energy audit instruments with its range and working [10]
b) What are the Principles of Energy management? [6]

OR

- Q10)** Describe the following system [16]
a) Lighting System
b) Cogeneration techniques & its application

Unit - VI

- Q11)** Write a short note on (Any Two) [16]
a) Sensitivity and risk analysis of energy financing
b) What are the today's needs to invest in energy sector
c) Energy project forecasting & management

OR

- Q12)** a) Annual saving after replacement of an boiler for 3 years is Rs. 5 lacks, Rs. 5,50,000/- Rs. 6,50,000/- respectively. Total project cost is Rs, 13,50,000/- Considering cost of capital as 12%, What is the NPV of the proposal. [8]
b) Explain financial analysis techniques. [8]



Total No. of Questions : 12]

SEAT No. :

P-1696

[4859]-36

[Total No. of Pages : 2

B. E.(Mechanical Engineering)
b-PRODUCT DESIGN AND DEVELOPMENT
(New 2008 Pattern) (Elective I) (Semester-I)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule , Mollier charts, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain product design evolution and innovation? [10]
b) What are the factors in product design? [8]

OR

- Q2)** a) Write product development planning with reference to ISO standard?[10]
b) What is need of Rapid prototyping? [8]

- Q3)** a) What is Mission Statement ? Write in detail Economic analysis of product? [8]
b) Explain in detail gathering customer needs information? [8]

OR

- Q4)** a) What is product function? Explain in detail brainstorming? [8]
b) Why there is need of Morphological analysis? [8]

P.T.O.

- Q5) a)** Distinguish between product development and process development?[8]
b) Write in detail Benchmarking approach and detailed procedure? [8]

OR

- Q6) a)** What is FMEA? Explain steps involved in it? [8]
b) Explain in detail Pugh' s concept? [8]

SECTION-II

- Q7) a)** What is Reverse Engineering? Write its detailed information? [10]
b) Explain in detail step involved in product teardown process? [8]

OR

- Q8) a)** Write in detail Measurement and experimentation? [10]
b) Explain the need of product portfolio and architecture? [8]

- Q9) a)** What is design for assembly? Write its concept in detail? [8]
b) Explain in detail DFX method and its application. [8]

OR

- Q10)a)** Explain in detail manufacturing cost analysis? [8]
b) Explain need and importance of design for environment? [8]

- Q11)a)** Write short notes on: [8]
i) Phases of Product life cycle.
ii) Elements of PLM.

- b) Write in detail need and benefits of product life cycle. [8]

OR

- Q12)a)** Explain in details customers need from product point of view. [8]
b) What is role of design department in industry? [8]



Total No. of Questions :12]

SEAT No. :

P3519

[4859] -360

[Total No. of Pages : 2

**B.E. (AUTOMOBILE)
HYBRID, ELECTRIC & FUEL-CELL VEHICLES
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Write a short note on brushless motor. [8]

b) Enlist Advantages of electric vehicle [8]

OR

Q2) a) What do you mean by series & shunt wound DC motor? [8]

b) Write a brief information of AC induction motor. [8]

Q3) a) Enlist any 4 performance parameter & explain them in brief. [10]

b) How acceleration is achieved in case of hybrid vehicles. [8]

OR

Q4) a) Write a note on fuel economy of hybrid car. [8]

b) Make road load calculation sheet for hybrid vehicle. [10]

Q5) a) Explain power split for hybrid architecture. [8]

b) Write a short note on KERS. [8]

OR

Q6) a) What are the different battery parameters? Describe nickel-cadmium battery with neat sketch. [8]

b) Describe and explain IC, engine force velocity characteristic and road load characteristic [8]

P.T.O.

SECTION-II

- Q7)** a) Explain construction and working of proton exchange membrane fuel cell with neat sketch. [8]
b) Explain supercapacitor and ultra capacitor. [8]

OR

- Q8)** a) What are the characteristic of fuel cell. Explain solid oxide fuel cell with neat sketch. [8]
b) Explain fuel cell electric vehicle with neat sketch. [8]

- Q9)** a) Explain ultra high speed flywheel with neat sketch [8]
b) Explain continuously variable transmission with tractive effort speed characteristic of passenger car with arithmetic transmission. [10]

OR

- Q10)**a) Explain the power capacity of fly wheel system. [8]
b) Explain pneumatic hybrid engine system operation modes [10]

- Q11)**a) Explain with suitable examples about Nonelectric hybrid system (any2)[10]
b) How flywheel accumulators works? [6]

OR

- Q12)**a) How CVT affects performance of electric car? Explain wheel motors.[10]
b) Explain about Pneumatic Hybrid Engine Systems Operation Modes. [6]



Total No. of Questions : 12]

SEAT No. :

P1697

[4859]-37

[Total No. of Pages : 4

B.E. (Mechanical)

c - DESIGN OF PUMPS BLOWERS AND COMPRESSORS

(Elective - I) (2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of Logarithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam tables are allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain the following terms: **[8]**
- i) Flow Machines
 - ii) Turbines
 - iii) Pumps
 - iv) Compressible Flow Machines
- b) A turbo blower develops 750 mm W.G. at a speed of 1480 rpm and a flow rate of $38\text{m}^3/\text{s}$. It is desired to build a small model which develops the same head at a higher speed (2490 rpm) and low discharge. Determine the specific speed and the flow rate through the model. **[8]**

OR

- Q2) a)** Explain the performance characteristics of pumps, compressors, fans and blowers. **[10]**
- b) Write equations of energy transfer between fluid and rotor. **[6]**

P.T.O.

- Q3) a)** The impeller of a centrifugal pump has 1.4m outside diameter. It is used to lift 1800 liters of water per second against a head of 10 m. Its Vanes make an angle of 45° with the direction of motion at outlet and runs at 400 rpm. If the radial velocity of flow at outlet is 3.5 m/s, find the manometric efficiency. Also find the power required if the overall efficiency is 82%. [8]
- b) Explain various efficiencies of centrifugal pump. [8]

OR

- Q4) a)** Explain various types of characteristic curves usually prepared for centrifugal pumps. [8]
- b) What is NPSH? Derive the expression of the same. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation: Atmospheric pressure = 1.01 bar; vapour pressure = 0.022 bar; losses in suction pipe = 1.42 m; effective head of pump = 49m; and cavitation factor = 0.115. [8]

- Q5) a)** Explain the following terms: [8]
- Static Suction Head
 - Static Discharge Head
 - Total Static Head
- b) Explain the design procedure of centrifugal pump. [10]

OR

- Q6) a)** Explain various forms of corrosion occurred in hydraulic machines. [8]
- b) A centrifugal pump running at 1450 rpm has the characteristic as given below: [10]

Discharge (Lit/sec)	11.3	16.9	22.6	28.3	34	39.6	45.2
Head (m)	25.8	25	24.1	23.2	21.4	18.9	15.8
Efficiency %	65	70	73	74	72	69	62

Draw the operating characteristic of the pump and determine its specific speed. The pump lifts water against a static head of 12 m through a long pipeline in which the loss of head in meters, due to friction is given by the expression, $h_f = 0.012 Q^2$, where Q is the discharge in liters/sec. The minor losses in the pipe may be neglected. Determine the power required to drive the pump.

SECTION - II

- Q7)** a) Discuss various applications of fan. [8]
b) Explain functions of an airfoil and discuss the characteristics curves of airfoils. [8]

OR

- Q8)** a) How does dust erosion of centrifugal pump impeller occurs? What is its effect on the performance? [8]
b) Prove the following relations for an axial fan stage with UGV and DGVS: →

$$(\Delta p)_{st} = 2 \rho u^2 (\phi \tan \beta_2 - 1), \psi = 4(\phi \tan \beta_2 - 1) \text{ and } R = 1 \quad [8]$$

- Q9)** a) What are the main causes of noise generation? What are the methods of reducing fan noises? [8]
b) What is surging? What are its effects? What is stalling? How it is developed? [8]

OR

- Q10)** a) Explain briefly what is the purpose of inlet guide vanes and inducer blades. Why is the radial tipped impeller mostly used in centrifugal compressor stages? [8]
b) Stage design considerations and empirical relations used to determine various fan design parameters. [8]

- Q11)** a) What is the work done factor for an axial compressor stage? How does it vary with the number of stages? [8]

- b) Prove the following relation for isentropic flow in a radial tipped impeller.

$$\psi = 1; P_{r\bar{w}} = 1 + \left(\frac{U_2^2}{C_p \cdot T_{01}} \right) \cdot (y / y - 1); \text{ with usual notations.} \quad [10]$$

OR

Q12)a) Derive the following relations for an axial compressor stage with constant axial velocity. **[12]**

i) $(\tan \alpha_1 + \tan \beta_1) = (\tan \alpha_2 + \tan \beta_2) = (U/V_x)$

ii) $\psi = \phi(\tan \beta_1 - \tan \beta_2)$

iii) $\frac{(\Delta p)_{st}}{\rho u^2} = \phi(\tan \alpha_2 - \tan \alpha_1)$

iv) $(n_{st}) = \left(\frac{(\Delta p)_{st}}{\Omega \rho U V_x (\tan \alpha_2 - \tan \alpha_1)} \right)$; with usual notations.

b) What is “slipfactor”? What is its effect on the flow and the pressure ratio in the stage? **[6]**



Total No. of Questions : 12]

SEAT No. :

P1698

[4859]-38

[Total No. of Pages : 5

B.E. (Mechanical)

TRIBOLOGY

(2008 Course) (402044 (D)) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from section I and 3 questions from sections II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** State and explain applications and importance of tribology in industries.[7]
- b) Give a comparison of sliding and rolling contact bearings with reference to the following points: [9]
- i) Magnitude of load
 - ii) Nature of load
 - iii) Speed
 - iv) Life
 - v) Frictional loss
 - vi) Space requirement
 - vii) Positional accuracy
 - viii) Noise
 - ix) Cost

OR

P.T.O.

- Q2) a)** Explain the use of following additives: [8]
- i) Anti-wear additives
 - ii) Anti-foam additives
 - iii) Anti-friction additives
 - iv) Anti-scuff additives
- b) Explain the importance of recycling of used oils. Explain different ways of disposal of used oil. [8]

- Q3) a)** Using the Bowden and Tabor's theory of simple adhesion prove that coefficient friction due to adhesion is $f_a = \frac{kS_{sy}}{S_{yc}}$ and $fa=0.1667$ for $k=0.5$ with usual notations [10]
- b) Discuss the effect of following on coefficient of friction between two surfaces [6]
- i) Surface finish,
 - ii) Sliding velocity

OR

- Q4) a)** Show that the volume of abrasive wear per unit sliding distance with conical abrasive particles is given by [8]

$$Q = \left[\frac{2k_w \cot \alpha}{\pi} \right] \frac{W}{P} \text{ with usual notations.}$$

- b) Draw and explain the classification of wear measuring machines along with sketches of at least four types. [8]

- Q5) a)** State assumptions in Reynolds equation and Derive from basic principle two dimensional Reynolds equation. [14]

- b) Using diagram show the pressure distribution along the axis and circumference in infinitely narrow/short hydrodynamic journal bearing. [4]

OR

Q6) a) Using diagram show the pressure distribution along the axis and circumference in infinitely long hydrodynamic journal bearing. [4]

b) Following data is given for hydrodynamic full journal bearing [14]

Radial load of = 10 kN

Journal speed = 1440 r.p.m.

Viscosity of lubricating oil = 30 m Pa s

Unit bearing pressure = 1000 k Pa

Clearance ratio (r/c) = 800

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Use given data in **Table No. - 1** and calculate:

- i) The dimension of bearing,
- ii) The coefficient of friction,
- iii) The power lost in friction,
- iv) Total oil flow in litter/minutes,
- v) Side leakage,
- vi) Temperature rise.

Table 1 Dimensionless performance parameters for full journal bearing with side flows

$\left(\frac{l}{d}\right)$	ϵ	$\left(\frac{k_0}{c}\right)$	S	ϕ	$\left(\frac{r}{c}\right)^f$	$\left(\frac{Q}{r c N_s l}\right)$	$\left(\frac{Q_s}{Q}\right)$	$\left(\frac{P}{P_{max}}\right)$
.1	0	1.0	∞	(85)	∞	∞	0	-
	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152
	1.0	0	0	0	0	0	1.0	0

SECTION - II

Q7) Following data is given for a hydrostatic thrust bearing **[18]**

Thrust load	=	450 kN
Shaft speed	=	750 r.p.m.
Shaft diameter	=	400 mm
Recess diameter	=	250 mm
Viscosity of lubricant	=	30 cP
Specific Gravity of lubricant	=	0.86
Specific heat of lubricant	=	2 kJ/kg°C

Draw a neat sketch showing the effect of film thickness on energy losses.

Calculate:

- a) The optimum oil film thickness for minimum power loss,
- b) The total power loss,
- c) The temperature rise, assuming the total power loss in bearing is converted into frictional heat.

OR

Q8) a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h_1 , if both the surfaces are separated by a lubricant of viscosity ' μ '. Derive the expression for the time 't' taken to reduce the film thickness from h_1 to h_2 . **[12]**

b) State and explain different types of energy losses in hydrostatic bearing. **[6]**

Q9) a) Write short note on: lubrication in Rolling and Extrusion with neat sketch. **[8]**

b) Write short note on: **[8]**

- i) Labyrinth seal
- ii) Metallic Gasket

OR

Q10)a) What is self lubricating bearing? Discuss the property of any two materials which are used for making self lubricating bearing. [8]

b) Explain requirements of Gas lubrication and its merits, demerits and application. [8]

Q11)a) Define the term ‘Superficial layers’, discuss the development of concept and structure of superficial layers. [10]

b) Explain electroplating and also write its advantages and limitations. [6]

OR

Q12)a) What are the different parameters of coating, explain in brief. [6]

b) Write short note on Cladded Coating and Metal Spraying. [10]



Total No. of Questions : 12]

SEAT No. :

P1699

[4859]-39

[Total No. of Pages : 3

B. E. (Mechanical)

**a : AUTOMOBILE ENGINEERING
(2008 Course) (Semester-I)(Elective-II)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain with neat sketch layout of a four wheel drive. [8]
b) What is chassis? What are the various components of chassis? Indicate their functions. [8]

OR

- Q2)** a) Discuss various types of car bodies with suitable examples. [8]
b) Explain various section used for side members and cross members of Chassis frame. [8]

- Q3)** a) Compare Synchromesh gear box with Constant mesh gear box. Explain the purpose of Synchronizer and its operation in a gear box. [8]
b) Explain with neat sketch construction and working of multi-plate clutch. [8]

OR

- Q4)** a) Describe the operation of non-slip differential used in automobiles. [6]
b) Explain with neat sketch construction and working of overdrive. [10]

P.T.O.

- Q5) a)** Sketch recirculating ball type steering gear and explain its working. [6]
- b) Explain with neat sketch construction and working of collapsible steering. [6]
- c) Describe live axle and dead axle. [6]

OR

- Q6) a)** Discuss necessity of Wheel Alignment and Wheel Balancing with their explanation. [8]
- b) How are the tyres are classified and rated ? What are dvantages of tubeless tyre over tubed tyre. [10]

SECTION-II

- Q7) a)** Classify Brakes and explain Anti-skid Braking System (ABS)with neat sketch. [10]
- b) What is interconnected suspension ? Sketch and describe in briefly. [8]

OR

- Q8) a)** Explain hydro gas suspension system. Also write its advantages and disadvantages. [10]
- b) Describe servo and power braking system with neat labelled sketch. [8]

- Q9) a)** Describe vehicle electrical systems with neat labelled layout. [8]
- b) Explain with neat sketch of lead acid battery. [8]

OR

- Q10)a)** Explain with neat sketch of electrical car layout. [8]
- b) Explain with neat sketch charging system used in automobiles. [8]

- Q11)** a) Necessity of NVH analysis in Automobiles, explain in detail. [8]
b) Justify importance of Vehicle interiors and Ergonomics in automotive safety. [8]

OR

Q12) Write short notes:(Any four) [16]

- a) Vehicle performance curve.
- b) Vehicle charging system.
- c) Sensors and actuators.
- d) Dashboard instrument.
- e) Air bags & seat belt.



Total No. of Questions : 8]

SEAT No. :

P1677

[4859]-4

[Total No. of Pages :3

B.E. (CIVIL)

a-STRUCTURAL DESIGN OF BRIDGES

(Elective-I) (2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) *Answer Q.1 or Q.2,Q.3 or Q.4, From Section-I.*
- 2) *Answer Q.5 or Q.6,Q.7 or Q.8, From Section-II.*
- 3) *Answer to the two sections should be written in separate answer books.*
- 4) *Figures to the right indicates full marks.*
- 5) *IS 456, IS800,IS1343,IRC-21-2000, IRC-83 PART-I and steel tables are allowed.*
- 6) *Assume suitable data wherever necessary and mentioned it clearly.*

SECTION - I

- Q1)** a) Explain various loads specified by IRC [8]
b) Classify bridges according to material of construction and forms of superstructure. [10]
c) Explain roll of Impact factor in the design of highway bridges. [7]

OR

- Q2)** a) Explain Pigeaud's Method of analysis of slab bridges. [8]
b) Explain Courbon's theory of determining the load carried by longitudinal girder. [10]
c) Explain the Economic span of the bridges and how it is calculated. [7]

Q3) Design the Cantilever slab and Interior panel of the deck slab of R.C.C T-beam deck slab Bridge with the given details and draw the necessary details.[25]

- a) Carriage way-2 lane
- b) Footpath on either side-1.2 m
- c) Thickness of railing-100mm
- d) Thickness of footpath--150mm
- e) Thickness of wearing coat-80mm
- f) Span of main girder-25m
- g) Spacing of cross beams--3.0mc/c
- h) Live load IRC class AA tracked vehicle
- i) Use M-40 and Fe-500
- j) Assume $m_1 = 0.055$ and $m_2 = 0.038$

P.T.O.

OR

Q4) For the R.C.C T-Beam deck Slab Bridge given in Que-No-3 design the intermediate post tensioned girder along with end block Use M-45 grade of concrete and high Tensile strands 7 ply 15.2 mm in diameter having ultimate tensile strength of 1600 N/mm^2 . Use Fe-415 for supplementary reinforcement consider loss ratio as 0.85 sketch the cable profile. **[25]**

SECTION - II

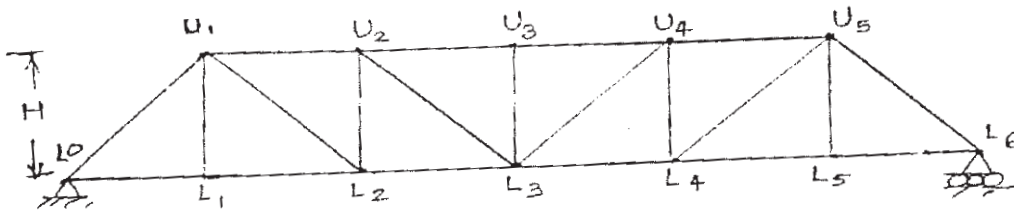
- Q5)** a) Explain in brief the advantages of steel bridges over concrete bridges. **[10]**
- b) Explain in brief with neat sketches the various types of railway steel bridges. **[10]**
- c) Explain the function of bracings. **[5]**

OR

- Q6)** a) Design elastomeric bearing for the given data and also sketch the details. **[18]**
- i) Maximum normal load = 1500 kN.
 - ii) Minimum normal load = 250 kN.
 - iii) Lateral load = 25 kN.
 - iv) Longitudinal load = 80 kN.
 - v) Total longitudinal translation = 10 mm.
 - vi) Rotation at support = 0.0015.
 - vii) Shear modulus of elastomer = 1.2 N/mm^2 .
 - viii) Allowable compressive stress for concrete = 8 N/mm^2
 - ix) Allowable compressive stress for elastomer = 7 N/mm^2 .
- b) What are the factors considered during the selection of bearing for steel bridges? **[7]**

Q7) Using channel sections, design the members U2-U3, U2-L3 and U3-L3 for the railway steel truss bridge shown in Fig. below. Also draw a neat sketch of the connection of members at U3. [25]

- a) Weight of stock rail - 0.70 kN/m.
- b) Weight of check rail - 0.50 kN/m.
- c) Timber sleepers of size - (0.25 x 0.25 x 2.5)m @ 0.45 m c/c.
- d) Unit weight of timber - 7.0kN/m³.
- e) Spacing of truss - 6.0 m c/c.
- f) The bridge supports a EUDL of 2950 kN.
- g) Assume height of truss is 6.0m.
- h) Assume 6 panels @ 5m each.



OR

Q8) For the railway bridge shown in Fig. 7, design the top and bottom lateral bracing with the given data. The rails are 650 mm above the c.g. of bottom chord. The chord members are 450 mm deep and 550 mm wide. The end posts are 450 mm deep and 450 mm wide. The web members are 450 mm deep and 250 mm wide. [25]



Total No. of Questions : 12]

SEAT No. :

P3927

[Total No. of Pages : 2

[4859]-40

B.E. (Mechanical) (Semester - I)
MACHINE TOOL DESIGN (Elective - II)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer three questions from section I and three questions from section II.*
- 2) Answer to the two sections should be written in separate answer book.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data, if necessary.*

SECTION - I

Q1) Sketch and explain elements of hydraulic transmission elements used in machine tools. **[16]**

OR

Q2) Explain machine tool design process with the help of block diagram. **[16]**

Q3) Discuss the design criteria for machine tool structures. **[16]**

OR

Q4) Discuss the factors affecting stiffness of machine tool structure and methods of improving it. **[16]**

Q5) Explain design criteria for slideways. **[18]**

OR

Q6) Discuss the procedure for design of hydrodynamic slideways. **[18]**

P.T.O.

SECTION - II

Q7) Discuss the design calculations for spindles. [16]

OR

Q8) Write a short note on anti-friction bearing. [16]

Q9) Write a short note on dynamic characteristic of cutting process. [16]

OR

Q10) Describe the design considerations and methods used to vibrations in machine tool. [16]

Q11) Write a short note on design consideration in micro machining. [18]

OR

Q12) Write a short note on recent trends in machine tool automation. [18]



Total No. of Questions : 12]

SEAT No. :

P1700

[4859]-41

[Total No. of Pages : 5

B.E. (Mechanical)

c - QUANTITATIVE & DECISION MAKING TECHNIQUE

(2008 Course) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to each sections should be written in separate answer sheet.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of non programmable calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define Operations Research with its Advantages and Limitations. [6]
b) Solve following Game problem by Graphical Method. [10]

	B1	B2	B3	B4
A1	-7	7	-4	8
A2	6	-4	-2	-6

OR

- Q2)** a) Explain: [6]
i) Pure and Mixed Strategies.
ii) Dominance Rule.
b) Solve following 4×4 Game Problem. [10]

	B1	B2	B3	B4
A1	5	-4	-4	6
A2	-3	-2	-3	-6
A3	6	8	-4	-1
A4	7	3	-9	-3

P.T.O.

Q3) Solve following LPP by Simplex Method.

[18]

$$\text{Maximize } Z = 4000x_1 + 2000x_2 + 5000x_3$$

$$\text{Subject to } 12x_1 + 7x_2 + 9x_3 \leq 1260$$

$$22x_1 + 18x_2 + 16x_3 \leq 19008$$

$$2x_1 + 4x_2 + 3x_3 \leq 396$$

OR

Q4) Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 Paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 Paise per gram. The daily minimum requirements of vitamin A and vitamin B are 100 and 120 units respectively. Find the minimum cost of product mix by Big M Method. [18]

Q5) a) Solve following transportation problem by VAM method and find optimum solution by MODI method. Where S1, S2, S3, S4 are supply centers and D1, D2, D3 are demand centers. [12]

	D1	D2	D3	Supply
S1	7	10	5	90
S2	12	9	4	50
S3	7	3	11	80
S4	9	5	7	60
Demand	120	100	110	

b) Explain LCM

[4]

OR

Q6) a) Explain concept of Trans-shipment problem with suitable example. [6]

b) Solve following Minimization Assignment Problem with Hungarian Method. [10]

	I	II	III	IV	V	VI
A	9	22	58	11	19	27
B	43	78	72	50	63	48
C	41	28	91	37	45	33
D	74	42	27	49	39	32
E	36	11	57	22	25	18
F	3	56	53	31	17	28

SECTION - II

- Q7) a)** Write a note on Monte - Carlo Simulation. **[4]**
- b) Annual Demand of Baby-dolls is 2000. Its ordering cost is Rs. 150 per order. Holding Cost is Rs. 2.4 per unit per annum and shortage cost is Rs. 1.6 per unit per annum. Assume total working days are 250 / year and Lead Time is 15 days. Calculate Economic Order Quantity, Optimal level of Shortages, Maximum Inventory Level, Total Variable Cost (Ordering + Holding) and Re-order Level. **[12]**

OR

- Q8) a)** Define any three from following: **[6]**
- i) Queue Length
 - ii) Traffic Intensity
 - iii) Service Channels
 - iv) Service in Priority
- b) A Xerox machine is managed by a single operator who on an average takes 10 minutes for each customer. The arrival of customer follows Poisson's distribution with an average rate of four per hour. The service times are exponentially distributed. Calculate **[10]**
- i) Expected Number of customers in system
 - ii) Fraction of time spent by each customer in the system
 - iii) Fraction of time during which shop is empty
 - iv) What is the probability that 2 customers will be in shop
 - v) What is the probability that 5 customers will be in system

- Q9) a)** The following failure rates have been observed for a certain type of transistor in a digital computer. **[12]**

Week	1	2	3	4	5	6	7	8
Probability of failure	0.03	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed transistor is Rs. 1.25. The decision is made to replace all these transistors simultaneously at fixed intervals and the individual transistors as they fail in service. If cost of group replacement is Rs. 0.3 per transistor what is the best interval between group replacements. Assume Number of transistors 1000 at start.

- b) Differentiate between payback period method and IRR method. **[4]**

OR

Q10)a) Explain break even analysis and margin of safety with neat sketch. [6]

b) Following Figures are related to nut manufacturing company. [10]

Variable Cost per unit = 8 Rs.

Sell Price per unit = 12 Rs.

Total Units Sold = 1,20,000

Fixed Cost = Rs. 25,000

Calculate ; P/V Ratio, B.E.P. Units, B.E.P. in sales, Margin of Safety, Total Profit.

Q11) Write short notes on any three: [18]

- a) Differentiate PERT and CPM
- b) Types of Floats
- c) Fulkerson's Rule
- d) Goal Programming

OR

Q12) The time estimates in weeks for activities of a PERT network are given below: [18]

Activity	Optimistic Time	Most Likely Time	Pessimistic Time
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

For above $Z = 1.33$ for $P = 0.9082$; $Z = 0.67$ for $P = 0.7486$ and $Z = 1$ for $P = 0.8413$

- a) Draw Network Diagram.
- b) Determine Expected Project Length.
- c) Calculate standard deviation and variance of project length.
- d) What is the probability that project will be completed
 - i) At least 4 weeks earlier than expected time.
 - ii) No more than 4 weeks than expected time.
- e) What should be scheduled time completion time for the probability of completion time to be 90% expected time.



Total No. of Questions : 12

P-1701

SEAT No. :

[Total No. of Pages :3

[4859]-42
BE (Mechanical)
Power Plant Engineering
(Semester -II) (2008 course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books*
- 3) *Draw diagrams wherever necessary.*
- 4) *Use of scientific calculator is allowed.*
- 5) *Assume suitable data Wherver necessary.*

SECTION-I

- Q1)** a) Discuss in detail how unit electricity cost is calculated. What are Fixed and variable costs **[8]**
- b) Discuss various factors considered for site selection of 'Thermal power plant'. **[4]**
- c) Explain various Tariff Methods for electrical energy in brief. **[4]**

OR

- Q2)** a) Explain the principle of economic scheduling. **[8]**
- b) A thermal power plant consists of two 60 MW units, each running for 8000 hours and one 30 MW unit running for 2000 hours per year. The energy produced by the plant is 876×10^6 kWh per year. Determine the plant load factor and plant use factor. Consider the maximum load as equal to the plant capacity. **[8]**
- Q3)** a) Explain the following: **[8]**
- i) Coal - Oil mixture (COM)
 - ii) Dust collectors.
- b) What do you understand by fluidized bed combustion (FBC)? Explain its working principle with neat sketch.

OR

P.T.O.

Q4) a) In a condenser test, the following observation were recorded: **[8]**

Vacuum = 715 mm of mercury

Barometer = 765 mm of mercury

Mean temperature of condensation = 34 deg C

Hot well temperature = 29 deg C

Inlet temperature of cooling water = 15 deg C

Outlet temperature of cooling water = 25 deg C

Determine:

- 1) Vacuum corrected to standard barometer of 760 mm.
 - 2) Vacuum efficiency.
 - 3) Undercooling of condensate.
 - 4) Condenser efficiency.
- b) Explain the working of electro- static precipitator with neat sketch. What are its advantages and disadvantages? **[8]**

Q5) a) Discuss the various methods to improve the thermal efficiency of gas turbine power plant. **[6]**

b) Write a note on Selection of Hydraulic turbine. **[6]**

c) Discuss in detail on: 'Free piston engine plant'. **[6]**

OR

Q6) a) Explain with neat sketch combined cycle gas turbine power plant. **[6]**

b) Explain with neat sketch the pumped storage peak load plant. **[6]**

c) Discuss the performance characteristics of gas turbine power plant. **[6]**

SECTION-II

Q7) a) Explain with neat sketch the construction and working of CANDU reactor. **[8]**

b) Diesel power plants are more suitable as peak load plants than base load plants. Justify. **[4]**

c) Classify nuclear reactor. Also state the functions of nuclear reactor. **[4]**

OR

- Q8)** a) Draw a line diagram to show the layout of Diesel Power plant and describe it in brief. State the function of each component. [8]
- b) Write note on nuclear waste disposal [4]
- c) State the functions of any two of the following: [4]
- i) Moderator
 - ii) Control rod.
 - iii) Coolant

- Q9)** a) Classify Tidal Power plants. What are the advantages and limitations of Tidal Power plant? Explain any one Tidal Power plant with neat sketch [8]
- b) What is a Circuit breaker? How are circuit breakers classified? Explain any one circuit breaker with neat sketch. [8]

OR

- Q10)** a) State the function of relay system. How are relays classified? Explain any one relay with neat sketch. [8]
- b) Discuss briefly the principle of Magneto Hydro Dynamic (MHD) Power generation system. [4]
- c) State the advantages and disadvantages of full cell. [4]

- Q11)** a) Explain the causes and effects of acid rain. [6]
- b) Write short note on: Thermal Pollution [6]
- c) What is particulate emission? How is it controlled? [6]

OR

- Q12)** a) Write a note on 'Pollution from Atomic Power Station'. [6]
- b) Discuss the harmful effects of following on human health and environment [8]
- i) CO_2
 - ii) CO
 - iii) Compounds of sulphur
 - iv) Oxides of Nitrogen
- c) What is Thermal Discharge Index (TDI) [4]



Total No. of Questions : 12]

SEAT No. :

P1702

[4859]-43

[Total No. of Pages : 5

**B. E. (Mechanical Engineering)
MECHANICAL SYSTEM DESIGN
(2008 Course) (Semester-II)**

Time : 4Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer THREE questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Write Clavarino's equation and explain terms involved in it? [4]
- b) Explain with two examples each of thick and thin cylinders? [4]
- c) A high pressure cylinder consists of steel tube with inner and outer diameters of 20mm and 35mm respectively. It is jacketed by outer steel tube with an outer diameter 50mm. The tubes are assembled by shrinking process in such a way that maximum principal stress induced in any tube is limited to 115Mpa . Calculate the interference pressure and original dimensions of tubes. Assume $E=207000 \text{ N/mm}^2$. [8]

OR

- Q2)** a) Explain the different types of end closures for the pressure vessels? [6]
- b) A cylindrical pressure vessel of 1100mm inner diameter is provided with a nozzle of 155mm inner diameter and 10mm thickness. Protruding lengths of nozzle inside and outside the vessel are 15mm and 20mm respectively and it is made up of seamless tube. The thickness of shell is 10mm. Internal pressure in the shell is 3MPa. The corrosion allowance is 1.5mm. Permissible tensile stress for shell and nozzle material is 200MPa. Design the dimensions of reinforcing pad if required. The reinforcing material is of same quality as that of the shell and is available in thickness of 10mm. (Take weld efficiency as 85%). [10]

P.T.O.

Q3) Design a connecting rod I section for an engine with following details: [16]

- a) Cylinder bore:150mm.
- b) Length of Connecting -rod:450mm.
- c) Maximum gas pressure:6MPa.
- d) Overall width to height ratio of 'I' cross section as $4t$ to $5t$ where 't' is the uniform thickness of cross section.
- e) Compressive yield stress= 330N/mm^2 .
- f) Factor of safety=6.

OR

Q4) Following data is given for a single cylinder four stroke diesel engine: [16]

Cylinder bore = 100mm

Length of stroke = 125mm

Speed = 2000 rpm

Brake mean effective pressure= 0.65Mpa

Maximum gas pressure = 5Mpa

Fuel consumption=0.25 kg per BP per h

Higher calorific value of fuel = 42000 kJ/kg

Assume that piston transmits 5% of total heat developed in cylinder. Permissible stress of piston material is 37.5 N/mm^2 ($k=46.6\text{ W/m}^\circ\text{C}$). Temperature difference between center and the edge of piston head is 220°C .

- a) Calculate thickness of piston head by strength consideration.
- b) Calculate thickness of piston head by thermal consideration.
- c) Decide on the criteria that decides piston head thickness.
- d) Decide if ribs are required.
- e) If yes, calculate number and thickness of piston ribs.
- f) Decide whether a cup is required at the top of piston head.
- g) If yes, calculate radius of cup.

- Q5) a)** What are the types of Optimum design ? Differentiate between them? [6]
- b)** A tensile bar of length 300mm is subjected to constant tensile force of 7500N. If the factor of safety is 4, design the bar diameter, using Johnson's method of optimum design, with the objective of minimizing material weight using optimum material from the list given below. [12]

Material	Density(ρ) kg/m ³	Cost(c) Rs/kg	Syt N/mm ²
Steel	7800	28	400
Aluminum alloy	2800	132	150
Titanium Alloy	4500	2200	800

OR

- Q6)** Solve the problem from the question 5(b), if the cross sectional diameter of the tension bar should not be less than 10mm. [18]

SECTION-II

- Q7) a)** A rigid coupling is assembled with recommended fit $60 H_6-j_5$ between the recess and the spigot. The dimensions of the two components are normally distributed and the specified tolerance is equal to the natural tolerance. Determine the probability of interference fit between the two components. The tolerances in micron are as follows: [10]

Diameter,(mm)	H_6		j_5	
	e_s	e_i	e_s	e_i
60	+19	0	+6	-7

The areas under the standard normal distribution curve from zero to z are as follows;

z	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Area	0.4192	0.4452	0.4641	0.4772	0.4861	0.4918	0.4953	0.4974	0.4987

b) Explain the basic principles of DFMA. [6]

OR

Q8) a) A batch of spindles to be used in machine tool, are to be designed for a mean torque transmitting capacity of 15N-m. The spindles are subjected to a mean load torque of 10 N-m. The torque transmitting capacity as well as the load torque is normally distributed with a standard deviation of 2 N-m and 2.5 N-m respectively. Estimate the percentage of spindles likely to fail. The areas under the standard normal distribution curve from zero to z are as follows; [10]

z	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772	0.4861	0.4918	0.4953	0.4974	0.4987

b) Explain ergonomic considerations in design for display and controls with suitable sketch ? [6]

Q9)a) Organize in a tabulated form comparison between different gear box design progressions? [6]

b) Describe the basic considerations in design of drives? [6]

c) Draw the struture diagram and gear box arrangement for following equations of a six speed gear box :(i) $z=2(1) 3(2)$, (ii) $z=2(3) 3(1)$, (iii) $z=3(1) 2(3)$, (iv) $z=3(2) 2(1)$. [4]

OR

Q10) A two stage, nine speed gear box is connected to a motor running at 720 rpm through a belt drive. The gear box is to have a minimum speed of 31.5 rpm and a maximum speed of 500 rpm. Using standard spindle speeds, [16]

- a) Draw the structure and speed diagram.
- b) Draw the gear box layout.
- c) Determine the number of teeth on each gear.
- d) Draw percentage deviation diagram and check if design is within permissible limits.
- e) Select diameter of pulleys for belt drive based on R20 series with diameter beginning from 80 mm.

Q11)a) Explain with neat sketch any one tension take up device used in belt conveyor? [6]

b) What is sag in conveyors belts ? How it is kept in within permissible limit? [6]

c) A horizontal belt conveyor transports material of mass density 1200 kg/m^3 . The surcharge factor for the flat belt drive is 0.16 and the belt width is 650 mm. Determine the capacity of the conveyor, if the belt speed is 1.75 m/s and the effective width b (in meters) of the material carried by the belt safely is given by the equation: $b = 0.9B - 0.05$; where B is the belt width in meters. [6]

OR

Q12)a) State and explain the objectives of material handling system? [4]

b) Describe different types of idlers and their characteristics using neat sketches? [6]

c) Design a belt conveyor to carry material at the rate of $3 \times 10^5 \text{ kg/hr}$ with the following details. Bulk density of material is 800 kg/m^3 , angle of bulk material surcharge is 15° , belt speed is 10 km/hr, belt has 4 plies, material factor k_1 for plies is 2.0, belt tension and arc of contact factor k_2 is 63. Determine: [8]

- i) Suitable belt width.
- ii) Drive pulley diameter and length.



Total No. of Questions :12]

SEAT No. :

P1703

[4859]-44

[Total No. of Pages :4

B.E (Mechanical)

a : COMPUTATIONAL FLUID DYNAMICS

(2008 Course) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use scientific calculator is allowed.*
- 6) *Assume suitable data, if necessary and mention it clearly.*

SECTION - I

- Q1)** a) State different models of flow using control volume and explain the conservation and non-conservation form of equations. **[8]**
- b) What is substantial derivative? Explain the local and convective derivatives with suitable physical example. **[8]**

OR

- Q2)** Consider an appropriate control volume model and derive an expression for 3-D conservative form of momentum equation in partial differential form. **[16]**
- a) Justify the selection of the control volume model used to derive momentum equation in conservation form.
- b) Explain the force components in brief.
- Q3)** a) Derive expressions for first order accurate forward difference, backward difference and central difference equations in y-direction. Explain order of accuracy for each expression. **[10]**
- b) Explain underrelaxation and overrelaxation with its merits and demerits. **[6]**

OR

P.T.O.

Q4) a) Discretize the following equations with suitable approximations. [6]

- i) The two dimensional steady state and transient heat conduction equation.
- ii) The one dimensional transient convection diffusion equation.

b) Consider a steady state heat transfer through circular cross-section tapered

fin, governed by the equation given below $\frac{\partial^2 T}{dx^2} = \frac{hp}{kA}(T - T_f)$.

The temperature at the one end of the fin, as shown in figure, $T_b = 125^\circ\text{C}$ and the temperature of the surrounding fluid is given as $T_f = 25^\circ\text{C}$. Assume the tapered end is insulated. Obtain the temperature at interior nodes placed equidistance using suitable numerical technique[10]

Assume $k = 1 \text{ W/mK}$ and $h = 10 \text{ W/m}^2\text{K}$

$D_1 = 20 \text{ mm}$, $D_5 = 10 \text{ mm}$ $L = 120 \text{ mm}$, Taper angle, $\Theta = 2.39^\circ$

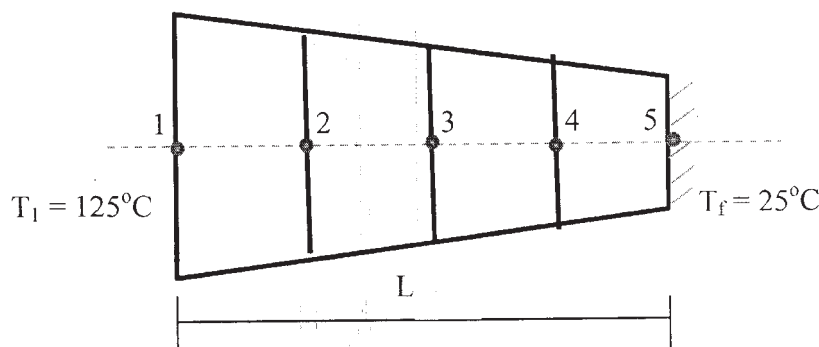


Figure 1

Q5) a) Explain in detail different types of boundary conditions. Give suitable example for each boundary condition. [8]

b) Explain Thomas algorithm in detail for the solution of tri-diagonal matrix system. Give one example of a physical system where you get a tridiagonal system. [10]

OR

Q6) Two parallel plates with an infinite length are separated by distance 40mm. The lower plate is stationary while the upper plate is started moving with velocity 40 m/s. The flow is governed by following equation.

$$\rho \frac{\partial u}{\partial t} = \mu \frac{\partial^2 u}{\partial y^2}$$

Find the velocity distribution in y-direction for single time step with $\Delta t = 0.5s$. Apply Crank-Nicolson's implicit method and use 5 nodes for finite difference approximation. Assume density of the fluid 800 kg/m³ and the kinematic viscosity of the fluid is $2.17 \times 10^{-4} \text{ m}^2/\text{s}$. **[18]**

SECTION - II

- Q7)** a) Explain MacCormack's technique with predictor and corrector step. **[8]**
- b) What is implicit method? Explain in detail about Alternating Direction Implicit method. **[10]**

OR

Q8) Compute the solution of the first order wave equation with wave speed given as below **[18]**

$$\frac{\partial u}{\partial t} + C \frac{\partial u}{\partial x} = 0, \quad c = \text{constant} > 0$$

For the first two steps using

- a) Lax-Wendroff scheme and
- b) Mac-cormack scheme.
- c) Comment on which of the above two scheme is more accurate?

The initial condition and boundary conditions are given below.

Initial condition:
$$u(x, 0) = \begin{cases} (1-x)x, & 0 \leq x \leq 1 \\ 0, & x > 1 \end{cases}$$

Boundary condition:
$$u(0, t) = 0, \text{ for all } t.$$

Take $\Delta x = 0.25, C \frac{\Delta t}{\Delta x} = 0.25$

- Q9)** a) Derive a finite volume formulation for 2D convection diffusion equation. **[8]**
- b) What is upwind method? Derive an upwind formulation for 1D wave linear equation. **[8]**

OR

- Q10)**a) Explain in detail the merits of finite volume method over finite difference method. Justify your comments. **[8]**
- b) Develop the solution methodology for 2D, unsteady convection-diffusion equation. **[8]**
- Q11)**a) What is staggered grid? Explain its significance using incompressible flows. **[8]**
- b) Write in detail the SIMPLE algorithm to compute the flow field quantities. **[8]**

OR

- Q12)** Write short note on (Any three): **[16]**
- a) Structured Grid Generation.
- b) CFD Simulation process.
- c) Stability criteria.
- d) Finite volume method.

EEE

Total No. of Questions :12]

SEAT No. :

P1704

[4859]-45

[Total No. of Pages :4

B.E (Mechanical)

b:FINITE ELEMENT METHOD

(2008 Course) (Elective - III) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

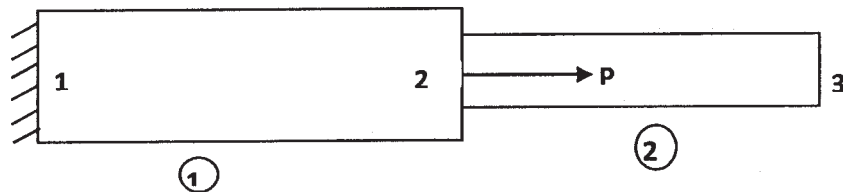
- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate answer book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Additional data sheet is attached for the reference.*

SECTION - I

- Q1) a)** Explain general FEM procedure for one dimensional structural linear Element. **[8]**
- b) Explain in brief concept of Cholesky's decomposition of matrix and banded skyline solution to solve the simultaneous equation in matrix form. **[8]**

OR

- Q2) a)** Explain in brief the concept plane stress, plain strain and Axi-symmetric. **[12]**
- b) Write a short note on Ritz method. **[4]**
- Q3) a)** Determine the nodal displacement at node 2, stresses in each material and support reactions in the bar shown in fig, due to applied force $P=400 \times 10^3 \text{ N}$ **[10]**



$$A_1 = 2400 \text{ mm}^2, A_2 = 1200 \text{ mm}^2, l_1 = 300 \text{ mm}, l_2 = 400 \text{ mm}$$

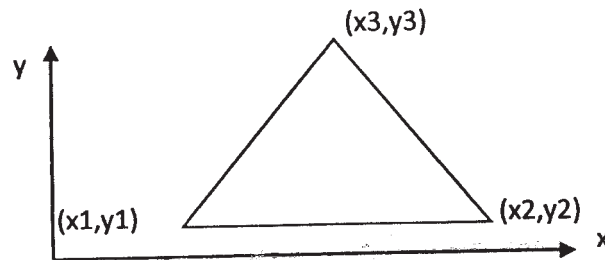
$$E_1 = 0.7 \times 10^5 \text{ N/mm}^2, E_2 = 2 \times 10^5 \text{ N/mm}^2$$

P.T.O.

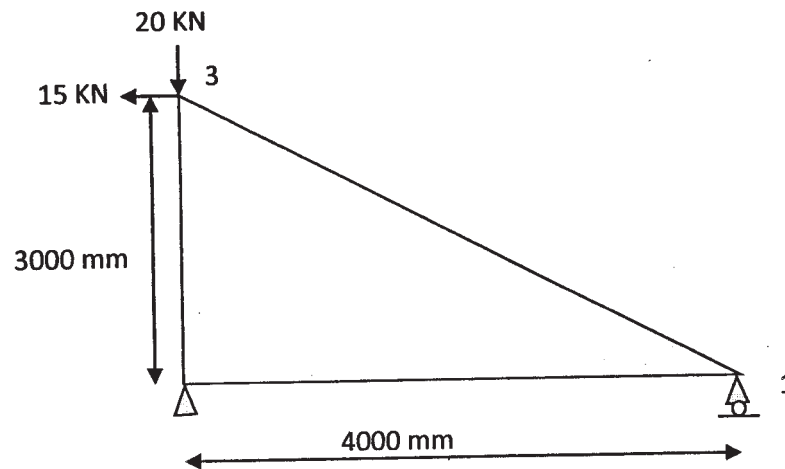
- b) State and explain principle of minimum potential approach to formulate FEM equation. [6]

OR

- Q4)** a) For the CST element shown in fig. Derive the shape function for 3 noded simple triangular elements. [4]



- b) Obtain the forces in the plane truss shown in fig. 1 and determine the support reactions also. Use finite element method. Take $E=200\text{Gpa}$ and $A=2000\text{ mm}^2$. [12]



- Q5)** a) Write a short note on: [12]

- i) Uniqueness of mapping in isoparametric elements.
- ii) Jacobian matrix.

- b) Explain the difference between p & h refinement. [6]

OR

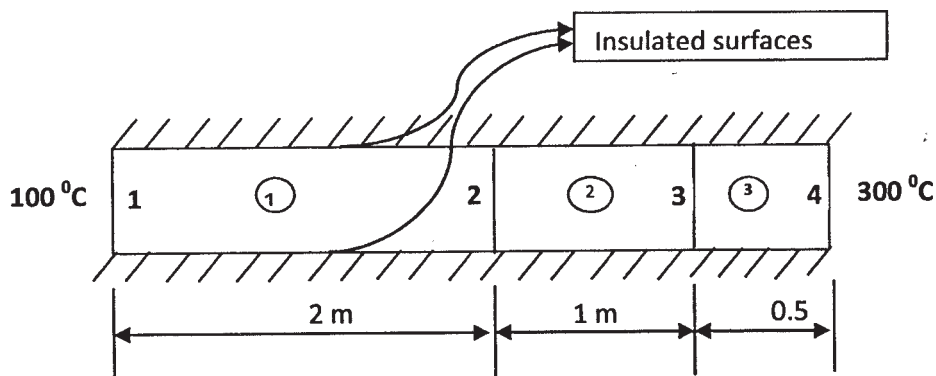
Q6) a) Explain the terms isoparametric, subparametric and superparametric elements and discuss the convergence criteria for isoparametric elements. [12]

b) Evaluate the integral using three point Gaussian quadrature method [6]

$$I = \int_{-1}^1 (3^x - 4x) dx$$

SECTION - II

Q7) For the one dimensional composite bar shown in fig, determine the interface temperatures. for element 1 let $K_{xx} = 200 \text{ W/m}^\circ\text{C}$, for element 2, let $K_{xx} = 100 \text{ W/m}^\circ\text{C}$ and for element 3, let $K_{xx} = 50 \text{ W/m}^\circ\text{C}$. Let $A = 0.1 \text{ m}^2$. The left has a constant temperature of 100°C and right end has a constant temperature of 300°C . [16]

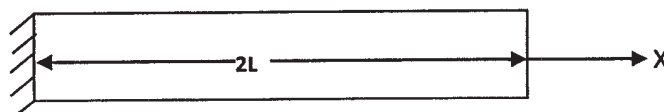


OR

Q8) a) Derive the stiffness matrix of 1D steady state conducting thermal element. [10]

b) Write a short note on 2D element used for heat transfer problem. [6]

Q9) For the bar shown in fig. with length $2L$, modulus of elasticity E , mass density ρ , and cross sectional area A , determine the first two natural frequencies. Divide the bar into two equal elements. [16]

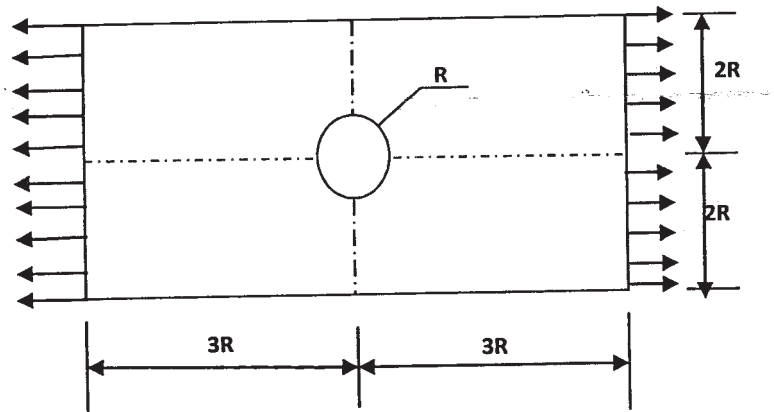


OR

- Q10)** a) Derive the consistent mass matrix for a truss element. [10]
 b) Explain the Eigen value problem for undamped-free vibration system. [6]
- Q11)** a) Explain the steps to be followed in pre-processing in FEM software. [6]
 b) What is non linearity? Explain different types of non linearities. [6]
 c) Explain aspect ratio and wrap angle. [6]

OR

- Q12)** Consider the problem given below of plate with center hole under plane stress. Answer the following questions.



- a) For minimum calculation what type of model used for analysis? [2]
 b) What type of meshing technique will you use between free Vs mapped meshing? Why? [6]
 c) Which type of refinement will you use? Where? [5]
 d) In post processing how will you interpret the result? And where will be the maximum stress location. [5]

EEE

Total No. of Questions :12]

SEAT No. :

P1705

[4859]-46

[Total No. of Pages :3

B.E (Mechanical)

ROBOTICS

(2008 Course) (Semester - II) (Elective - III) (402049 C)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1) a)** Explain the six degrees of freedom associated with the manipulator with neat sketch. **[6]**
- b) Describe various characteristics used to specify Industrial Robot. **[10]**

OR

- Q2) a)** In a robot, twisting joint wrist assembly can rotate through 10 full revolutions and is required to have a resolution of 0.2°. Find out the required bit storage capacity for achieving this resolution. **[8]**
- b) Explain the term 'compliance' in terms of a robot? Explain types of compliance. **[8]**
- Q3) a)** Differentiate between vacuum and magnetic grippers. **[4]**
- b) State different types of proximity sensors and explain any one in detail. **[6]**
- c) Which sensor can be used along with the gripper to sense whether the object is slipping? Explain its working principle. **[6]**

OR

P.T.O.

- Q4)** a) Explain the design consideration of gripper selection. [8]
 b) With neat sketch explain range sensors used in robot. [8]
- Q5)** a) What are advantages of PID feedback controller over PD controller. [4]
 b) Explain control law of partitioning. [6]
 c) Explain different types of actuators used in industrial robots. [8]

OR

- Q6)** a) Explain different types of controllers used in industrial robots. [8]
 b) The second joint of the $SCRP$ manipulator is required to move from $\alpha_2 = 30^\circ$ to 150° in 5 sec. Find the cubic polynomial to generate smooth trajectory of the joint. What is the maximum velocity possible for this trajectory? [10]

SECTION - II

- Q7)** a) Explain with suitable sketch, the difference between forward and inverse kinematics. [12]
 b) Describe the concept of acceleration of rigid body. [6]

OR

- Q8)** a) Write short notes on : [12]
 i) Kinematic Redundancy
 ii) D-H parameters.
 b) Explain with suitable example, the concept of Newton-Euler's dynamic formulation. [6]
- Q9)** a) What are the different types of commands used in robot programming? [8]
 b) Write short notes on Image Processing Techniques. [8]

OR

- Q10)a)** Explain and compare the different method of robot programming. [8]
b) What is need of vision system in robot? Classify the robotic vision system. [8]
- Q11)a)** Write short notes on simulation. [8]
b) Explain in brief, economical aspects for robot design. [8]

OR

- Q12)a)** Write short notes on 'Artificial Intelligence'. [8]
b) Write short notes on Future of Industrial robots. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1706

[4859]-47

[Total No. of Pages :5

B.E. (Mechanical)

**d:ADVANCED AIR-CONDITIONING & REFRIGERATION
(2008 Course) (Semester - II) (Elective - III) (402049)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer- books.*
- 3) *Draw diagrams wherever necessary.*
- 4) *Use of scientific calculator is allowed.*
- 5) *Assume suitable data wherever necessary.*

SECTION - I

- Q1)** a) Explain Ejector type transcritical refrigeration cycle. [8]
b) Explain actual vapour compression cycle using p-h and T-s diagram.[10]

OR

- Q2)** a) Write a short note on “Secondary Refrigerant”. [6]
b) 3TR HFC -134a refrigerating machine operates between a condenser temperature of 40°C and an evaporator temperature of 0°C. Calculate the increase (%) in the theoretical piston displacement/TR and the power consumption/TR of the cycle: take c_p of gas as 1.4 kJ/kg.K [12]
i) If the evaporating temperature is reduced to -30°C.

OR

- ii) If the condensing temperature is increased to 60°C.

Ts(°C)	h_f (kJ/kg)	h_g (kJ/kg)	S_f (kJ/kg)	S_g (kJ/kg)	V(m ³ /kg)
-30	162.33	387.08	-	1.7766	0.2240
0	200	405.17	-	1.7511	0.0689
40	256.43	426.17	1.1930	1.7350	0.0199
60	288.34	433.91	1.2893	1.7263	0.0114

P.T.O.

- Q3)** a) Discuss various types of cooling tower. [10]
b) Discuss the principal dimensions of reciprocating compressor. [6]

OR

- Q4)** a) A single cylinder, single acting reciprocating compressor with 5% clearance is used in a refrigeration cycle to take volumetric capacity 50 cmm at 5°C (3.6 bar) refrigeration temperature and 40°C(9.6 bar) condensing temperature. The compressor index is 1.15. The speed of the piston is limited to 3 m/s. Take L/D=1, specific volume as 0.0525 m³/kg. Determine: [8]
i) Power consumption of the compressor.
ii) Volumetric efficiency.
iii) Bore, stroke and RPM of the compressor.
- b) Write a short note on: [8]
i) Electronic expansion valve
ii) Design aspects of evaporator
- Q5)** a) Describe the methods of controlling IAQ. List the pollutants & contaminants present in the air with source. [8]
b) Explain the following: [8]
i) Thermal overload protection for hermetic motors.
ii) Reduced voltage protection.
iii) Motor over current protection.
iv) Adjustable speed drives.

OR

- Q6)** a) Explain the methods of purging noncondensables. [8]
b) Draw & explain electric circuit for oil pressure failure control. [8]

SECTION - II

- Q7) a)** A 25 cm brick wall with plaster on both sides exposed to the periodic temperature and incident radiant variation on an hourly basis between 7 am and 6 pm is given in the table. Determine the average and peak load on the air conditioner maintaining the room at 23°C per unit area of the wall. Also determine the heat gain at 5 pm and time of peak load. Use time lag & decrement method.

Reflectivity of plaster, = 0.4 [12]

Thermal conductivity of plaster, $k=0.14$ W/mK

Thickness of plaster material = 3 mm

Thermal conductivity, $k = 1.5$ W/mK

Outside wall coefficient, $h_o = 23$ W/m²K

Inside wall coefficient, $h_i = 7$ W/m²K

Average sol-air temperature (T_{em}) = 42.14°C

Time lag = 5hrs; Decrement factor = 0.455

Time	7	8	9	10	11	12	1	2	3	4	5	6
	am	am	am	am	am	noon	pm	pm	pm	pm	pm	pm
T_o (°C)	29	31.5	33.5	35.5	37	38.5	39.5	40.5	41.5	39.5	39	38
I (W/m ²)	186	390	640	814	954	1000	960	825	645	385	190	47

- b) Discuss inside design conditions of followings: [6]
- i) Cold storage
 - ii) Industrial air conditioning
 - iii) Comfort air conditioning

OR

- Q8) a)** Write a short note on: [4]
- Sol-air temperature
- b) Explain the purpose and scope of ECBC. [6]
- c) Discuss the factors affecting ETD. State the corrections applied for calculating ETD. [8]

- Q9)** a) Discuss the HVAC design criteria for IT centers. [8]
b) Draw and explain air-to-air heat pump circuits: Fixed refrigerant circuit. [8]

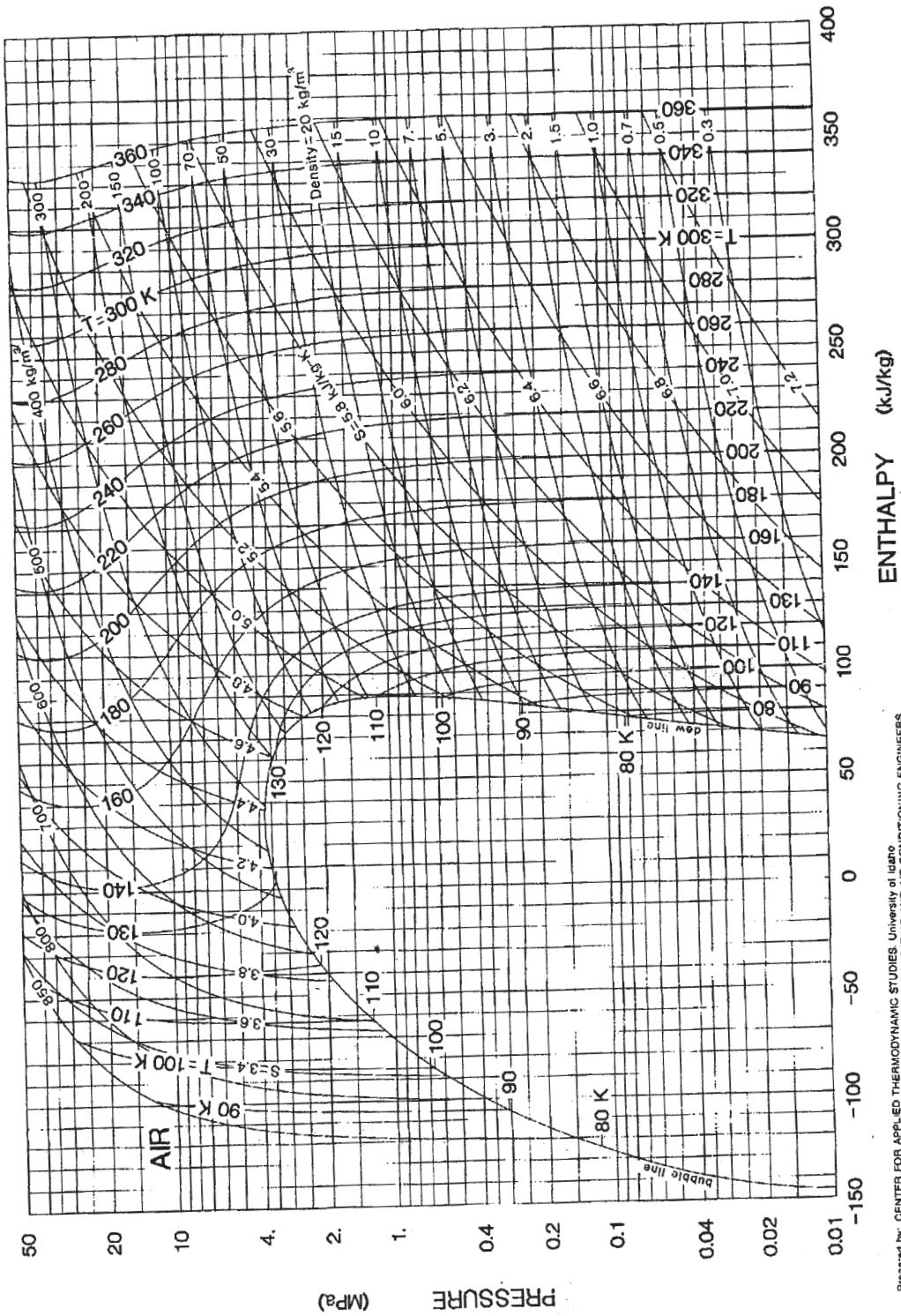
OR

- Q10)** a) Write a short note on “Air-conditioning of Multiplexes”. [4]
b) Draw and explain air-to-liquid heat pump circuit. [6]
c) A heat pump is used for heating a building with a design load of 50000kJ/hr. Water at 10°C is available as a heat source and air supplied to the room is to be at 40°C. If the actual EPR attained is 60% of reverse Carnot cycle operating between the same temperatures, determine [6]
i) Actual EPR of the heat pump system
ii) The power input if motor efficiency is 80%

- Q11)** a) List out the limitations of VCS for the production of low temperatures. [6]
b) Determine the following for a Linde system with air as working fluid when the system is operated between 1 bar and 200 bar at 300K. [10]
i) Ideal work
ii) Liquid yield
iii) Work per unit mass of compression
iv) Work per unit mass of liquefaction
v) Figure of merit

OR

- Q12)** a) Discuss types of insulations used for low temperature applications? [6]
b) 1 kg of air at 30°C and 1 bar compressed isothermally to 20 MPa in a compressor in a Claude cycle. Assume that 60% of the total mass of air compressed passes through the expander. The temperature of air entering the expander is -80°C, while the temperature of air leaving the expander is -140°C. The make-up air is supplied to the system at 30°C and 1 bar. Determine the yield of liquid and temperature of air before throttling. Draw the schematic diagram with T-s and p-h diagram. Use p-h chart of air. [10]



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Fig. 36 Pressure-Enthalpy Diagram for Refrigerant 729 (Air)

333

Total No. of Questions :8]

SEAT No. :

P1707

[4859]-48

[Total No. of Pages :4

B.E. (Mechanical Engg.)

**a-INDUSTRIAL HEAT TRANSFER EQUIPMENTS
(2008 Pattern) (Elective - IV) (Semester - II) (402050)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Question No.1 and No.5 are compulsory. Out of the remaining attempt any two questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) A chemical industry produces 200 tons of sulphuric acid per day when running for 24 hours. The acid is cooled in counter flow double pipe heat exchanger from 60°C to 40°C. The cooling medium employed is water, which enters the exchanger at 15°C and leaves at 20°C. The acid flows through the inner pipe, while the water flows through the annulus. The inner and outer diameters of inner pipe are 70 mm and 80 mm respectively, while those of outer pipe are 120 mm and 130 mm respectively. The thermal conductivity of inner pipe material is 46.5 w/m K. Calculate: **[12]**

- i) Mass flow rate of water per
- ii) Length of heat exchanger

Use the following properties of water and acid at mean bulk temperature:

Property	Water	Acid
$\rho(\text{kg/m}^3)$	998.2	1800
$C_p(\text{kJ/kg.K})$	4.18	1.465
$k_f(\text{W/m.K})$	0.598	0.302
$\nu(\text{m}^2/\text{s})$	1.006×10^{-6}	6.8×10^{-6}
$R_f(\text{m}^2.\text{K}/\text{W})$	-	0.0002

P.T.O.

- b) A shell and tube heat exchanger must be designed to heat 2.5 kg/s of water from 15 to 85°C. The heating is to be accomplished by passing hot engine oil which is available at 160°C, through the shell side of the exchanger. The oil is known to provide an average convection coefficient of 400 W/m² K on the outside of the tubes. Ten tubes pass the water through the shell. Each tube is thin walled, of diameter 25 mm, and makes eight passes through the shell. If the oil leaves the exchanger at 100°C, what is its flow rate? How long must the tubes be to accomplish the desired heating? [10]

Take for engine oil $C_p = 2350$ J/kg K.

For water $C_p = 4181$ J/kg K, $\mu = 548 \times 10^{-6}$ N.s/m², $k = 0.643$ W/m, $Pr = 3.56$.

- Q2)** a) Explain the various off-line mechanical cleaning methods used in heat exchanger. [6]
- b) Explain in details what you understand by flow-induced vibration as referred to shell and tube heat exchanger. [8]
- Q3)** a) Air at 25°C flows over a cross flow car radiator and cools water from 99°C to 60°C. Water flows at the rate of 4 kg/min through a number of separate passages within the heat exchanger. The mass flow rate of air is 14 kg/min. If overall heat transfer coefficient is 80 W/m² K. Determine the required heat transfer area and heat exchanger effectiveness. Assume [8]

- i) Clean and scale free heat transfer surfaces.
- ii) Constant specific heat of fluids over given temperatures ranges.

$$C_p, \text{ water} = 4186 \text{ J/kg K} \quad C_p, \text{ air} = 1006 \text{ J/kg K}$$

- iii) Overall heat transfer coefficient is constant.
- iv) Air is mixed fluid

Given that for cross flow heat exchanger

$$\epsilon = (1/R) [1 - \exp \{-R (1 - \exp (-NTU))\}]$$

$$\text{Where } R = C_{\min} / C_{\max}$$

- b) Explain the classification of plate heat exchanger with their applications. [6]

- Q4)** a) Explain the various types of shell standardized by TEMA. [8]
 b) Explain Bell's method for sizing of a shell and tube heat exchanger. [6]

SECTION - II

Q5) A rotary regenerator, with a rotational speed of 10 rpm is used to recover energy from a gas stream at 250°C flowing at 10 kg/s. This heat is transferred to the air stream at 10°C, also flowing at 10 kg/s. The wheel depth is 0.22 m and diameter 1.6 m, so that its face area is approximately 1.8 m². The mass of the matrix is 150 kg with a surface-to-volume ratio of 3000 m²/m³, and the mean specific heat of the matrix material is 0.8 kJ/kg K. The heat transfer coefficient for both fluid streams is 30 W/m² K. The mean isobaric specific heat of the gas is 1.15 kJ/kg K and that of air is 1.005 kJ/kg K. The flow split gas air = 50%:50%. For counter flow arrangement, calculate the following values: [18]

- a) The regenerator effectiveness.
 b) The rate of heat recovery and the outlet temperatures of air and gas.
 c) The rate of heat recovery and the outlet temperatures of air and gas if the rotational speed of wheel is increased to 20 rpm.
 d) The rate of heat recovery and the outlet temperatures of air and gas if the rotational speed of wheel is reduced to 5 rpm.

Q6) a) In a large steam power plant, a shell and tube type steam condenser is employed which has the following data: [12]

Heat exchange rate :2100Mw

Number of shell passes :one

Number of tubes (thin walled) :31500, each executing two passes

Diameter of each tube :25 mm

Mass flow rate of water through tubes :3.4 x 10⁴ kg/s

The condensation temperature of steam :50°C

(The steam condenses on the outer surface of the tubes)

The heat transfer coefficient on the steam side : $11400 \text{ W/m}^2\text{°C}$

The inlet temperature of water : 20°C

Using LMTD correction factor method and NTU method, calculate:

- i) The outlet temperature of cooling water and
- ii) The length of tube per pass

Take the following properties of water (at $t_{\text{bulk}} = 27\text{°C}$)

$C_p = 4.18 \text{ kJ/kg °C}$, $\mu = 855 \times 10^{-6} \text{ Ns/m}^2$, $k = 0.613 \text{ W/m °C}$ and $Pr = 5.83$.

The thermal resistance of tube material and fouling effects may be neglected.

- b) Explain the method to determine number of shells in shell and tube heat exchanger. [4]

Q7) a) A finned tube compact heat exchanger having the core configuration of figure 14. The core is fabricated from aluminium ($k = 237 \text{ W/m K}$) tubes have an inside diameter of 13.8 mm . In a waste recovery applications, the water flow through the tubes provides an inside convection coefficient of $1500 \text{ W/m}^2 \text{ K}$, while the combustion gases at 1 atm and 700 K are in cross flow over the tubes. If the gas flow rate is 1.25 kg/s and the frontal area is 0.2 m^2 , what is the overall heat transfer coefficient based on gas side? Take fin efficiency as 0.89 . [10]

- b) Write a short note on heat pipe exchanger. [6]

Q8) a) Explain the selection criteria of heat exchanger. [8]

- b) Explain design methodology for heat exchanger with the help of flow chart. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1708

[Total No. of Pages :3

[4859]-49

B.E. (Mechanical Engg.)

b-MANAGEMENT INFORMATION SYSTEMS

(Elective -IV) (Semester -II) (2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions from section I and section II.*
- 2) *Answer to the questions should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagrams wherever necessary.*

SECTION-I

- Q1)** a) Explain: (i) Elements of MIS ii) Management Processes Elements. [6]
b) Discuss the relationship between MIS and Management Process. [4]
c) Define Management. Explain management functions at various organization levels. [6]

OR

- Q2)** a) Define Management, Information and system. Write short note - Structure of MIS. [8]
b) Discussion about operational support systems and explanations about following types:
i) Transaction processing systems ii) Process control systems
iii) Enterprise collaboration systems. [8]

- Q3)** a) Explain what are the Building Blocks of Information system? [4]
b) Write a short note on behavioral decision making. [4]
c) Explain spiral model of SDLC with diagram. State its advantages and disadvantages

OR

P.T.O.

- Q4)** a) Explain Herbert Simon model of Decision process. [6]
b) Explain Spiral Shape SDLC model. [6]
c) Compare MIS and DSS. [6]

- Q5)** a) Defining the term knowledge Management System and explain about elements of knowledge Management System using block dig. and example [8]
b) Explain waterfall model of SDLC with diagram. State its advantages and disadvantages.

OR

- Q6)** a) Explain with block diagram system development life cycle. [8]
b) Write note on Data Flow Diagrams and ER Diagrams. [8]

SECTION -II

- Q7)** a) What is CMM? Explain Levels of CMM. [10]
b) State various Modern Software Design Methodologies. Explain Jackson System Development Method. [8]

OR

- Q8)** a) What is Software Performance Testing? Explain its types. [8]
b) The Cost of Performance failure of software is very high” Explain. [4]
c) What is verification? What are the terms involved in verification. [6]

- Q9)** a) Explain Black Box Testing? State its Advantages and Disadvantages. [8]
b) Write a note on Availability and Reliability. [8]

OR

- Q10)** a) What is Review? Explain its types.
b) Explain the types of software Maintenance

Q11)a) Explain the applications of MIS in HR Management with the help of block diagram . [8]

b) Explain the steps in 360° feedback. Give its advantages and Disadvantages [8]

OR

Q12)a) Explain the applications of MIS in supply chain Management with block diagram. [8]

b) What is Enterprise Management system? Explain the components of EMS. [8]



Total No. of Questions : 12]

SEAT No. :

P1678

[4859]-5

[Total No. of Pages :4

B.E. (CIVIL)

b-SYSTEM APPROACH IN CIVIL ENGINEERING

(Elective-I) (2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicates full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Explain the scope of 'System Approach' in Civil Engineering. **[10]**
- b)** Define: **[8]**
- i) Function
 - ii) Constraints
 - iii) Convex function
 - iv) Concave function

OR

- Q2)** Use the SIMPLEX method and solve following LP problem **[18]**
- Maximize $Z=3x_1+5x_2+4x_3$
- Subject to constraints,

$$2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15 \text{ and } x_1, x_2, x_3 \geq 0$$

- Q3) a)** Solve following LP by using two phase method **[12]**
- Max $Z = 4x_1+5x_2$
- Subject to

$$2x_1 + 3x_2 \leq 6$$

$$3x_1 + x_2 \geq 3$$

$$x_1, x_2 \geq 0$$

- b)** Explain schematic presentation of transportation Model. **[4]**

OR

P.T.O.

- Q4) a)** An Engineering firm wants to Assign 5 works to 5 Engineers. Calculate then time and day require to complete the specific work by each Engineer is given below. Determine assignment to minimize total time. **[10]**

Engg	Project work				
	1	2	3	4	5
A	3	5	10	15	8
B	4	7	15	18	8
C	8	12	20	20	12
D	5	5	8	10	6
E	10	10	15	25	10

- b) Explain Assignment Model and Enlist solution methods of Assignment problem. **[6]**

- Q5) a)** Explain: **[8]**

- i) Single stage Decision process
- ii) Multistage Decision process

- b) Explain characteristics of dynamic programming. **[8]**

OR

- Q6) a)** Enlist applications of dynamic programming. **[4]**

- b) Finance can Invest his money in 3 different fields. The total finance available with him are 6 money units. There turn depends upon the level of investments. The return functions for each investments are, **[12]**

Resource allocated	Return from		
	Field 1	Field 2	Field 3
0	0	0	0
2	6	4	8
4	10	12	12
6	14	14	16

Use Dynamic programming and determine the maximum return and the allocation of various fields.

SECTION - II

Q7) a) Using Lagrange's multiplier method minimize $f(x) = 18/x_1x_2$ [9]
Subjected to $x_1^2 + x_2^2 = 9$

b) Using Lagrange's multiplier method [9]
Max $Z = x_1^2 + 3x_2^2 + 2x_1x_2 + 2x_1 + 6x_2$
Subjected to $2x_2 - x_1 = 4$

OR

Q8) a) Enlist Direct search methods; and explain Fibonacci method. [9]
b) By using Fibonacci method solve maximize $F = 16x - 0.2x^2$ in the interval (0,100) to an accuracy of 0.1% [9]

Q9) a) Explain Queuing theory and state limitation of Queuing theory. [8]
b) Explain types of Queuing patterns with diagrams. [8]

OR

Q10) a) Dumper arrives of loading site in a pattern which can be characterized by the poisson distribution at an average of 18 trucks per hour. The loading by power shovel is done at a rate of 20 per hour per shovel. The cost of trucks Rs 500 per hour. Whereas the cost of shovel is Rs 300 per hour. Find the optimum numbers of shovels to be used. [8]
b) Explain Mont Carlo simulation. [8]

Q11) a) Solve the following games after reducing it to 2x2 game. [10]

PlayerA	B1	B2	B3
A1	1	7	2
A2	6	2	7
A3	5	1	6

b) Explain assumption of games and enlist the rules to determine saddle point. [6]

OR
3

- Q12)a)** A firm is considering replacement of a machine whose cost price is Rs.12,200/- and the scrap value is Rs.200/-. The Running cost is found from experience to be as follows. Find when should the machine replaced. **[8]**

Year	1	2	3	4	5	6	7	8
Running Cost	200	500	800	1200	1800	2500	3200	4000

- b)** The data on running cost per year and resale price of equipment A whose purchase Price is Rs.2,00,000/- are as follows find the optimum period of Replacement. **[8]**

Year	1	2	3	4	5	6	7
Running Cost (Rs)	30,000	38,000	46,000	58,000	72,000	90,000	1,10,000
Resale Value	1,00,000	50,000	25,000	12,000	8,000	8,000	8,000



Total No. of Questions :12]

SEAT No. :

P1709

[4859]-50

[Total No. of Pages :5

B.E. (Mechanical)

c:RELIABILITY ENGINEERING

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Figures in bracket to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary and mention it.*

SECTION - I

Q1) a) Define the terms:

[6]

- i) Failure density
- ii) Probability density function
- iii) Hazard rate
- iv) Cumulative distribution function

b) The following failure data is collected for a group of 650 components. Find the failure density, hazard rate & reliability & plot functions against time. **[10]**

Operating time (Hrs)	1	2	3	4	5	6	7	8	9	10
No. of failures	130	83	75	68	62	56	51	46	41	38

OR

P.T.O.

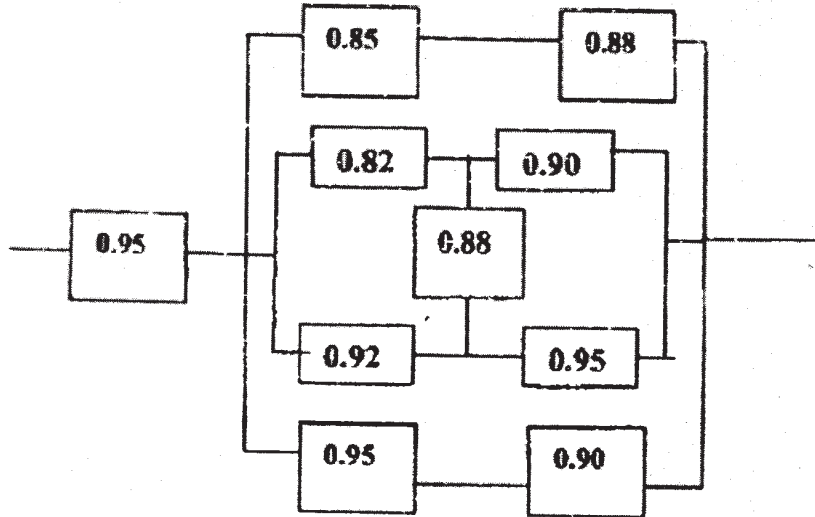
- Q2) a)** Why is the reliability important? Give any six reasons and explain. [8]
- b) Explain with neat sketch different modes of failure and its causes. [8]
- Q3) a)** A Q.C. engineer is checking the dimensions of mass produced iron bars. Following are the probabilities of getting a bar with various types of defects: [8]
- i) With bend = 0.003
 - ii) With oversize = 0.019
 - iii) With under size = 0.002
 - iv) With bend & oversize = 0.00045
 - v) With bend & undersize = 0.0005
- What is the probability of getting a bar with no defects?
- b) State and explain the theorem of Total Probability. [8]

OR

- Q4) a)** In a parallel system consisting of four identical independent units, the successful working of the system depends on any one unit operating satisfactorily. Determine the expression for the reliability in terms of failure rate λ & mission time t . If λ is considered as 0.005 & mission time 100 hrs, find reliability. [8]
- b) Discuss briefly various probability distributions. Explain Weibull distribution. [8]
- Q5) a)** Write a note on AGREE Allocation method. [6]
- b) A system consists of four subsystems A, B, C & D having failure rates 0.006, 0.0035, 0.004 & 0.002 respectively per hour. If the mission time is 100 hours & the system reliability required is 0.90, find the failure rate as well as reliability of each subsystem for the entire mission using ARINC method. [6]
- c) A system consists of four components connected in series with reliabilities 0.9, 0.8, 0.958, 0.95. It is desired that reliability of system should be 0.85. How this should be apportioned in three units using minimum effort method? [6]

OR

Q6) a) Find the reliability of the structure given below. [10]



b) Write a note on dynamic programming apportionment technique. [8]

SECTION - II

Q7) a) Explain maintainability. Name the different maintainability tools used. Elaborate on specific maintainability design considerations. [8]

b) Define inherent, achieved and operational availability. [3]

c) Following data is recorded for a system under consideration. Mean time between failures = 1250 hrs, mean active maintenance downtime = 130 hrs, Mean time to repair = 128 hrs, mean time between maintenances = 1380 hrs, MDT = 224 hrs. Find inherent, achieved and operational availability of the system. If MTTR to MTBF ratio changes to 0.32, what will be the inherent availability? [5]

OR

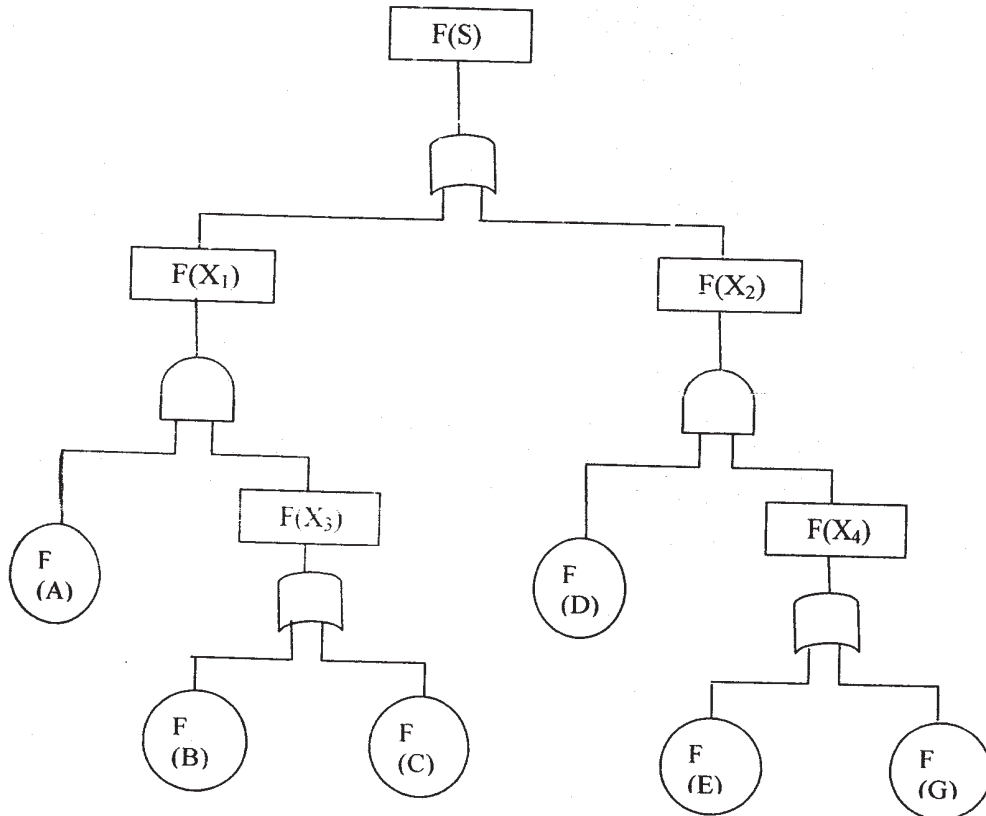
Q8) a) State and differentiate between MTBM and MTBF with a sketch. Explain the condition for them to be equal. [6]

b) A Drilling machine has achieved availability value of 0.92. The preventive and corrective maintenance requires down time of 345 hrs. The administrative and supply downtime of 96 hrs is added to maintenance downtime to get mean downtime. Find the operational availability. [6]

c) Explain the objectives of maintenance. [4]

Q9) a) What is the significance of rectangle, circle, AND and OR gate in a fault tree? [6]

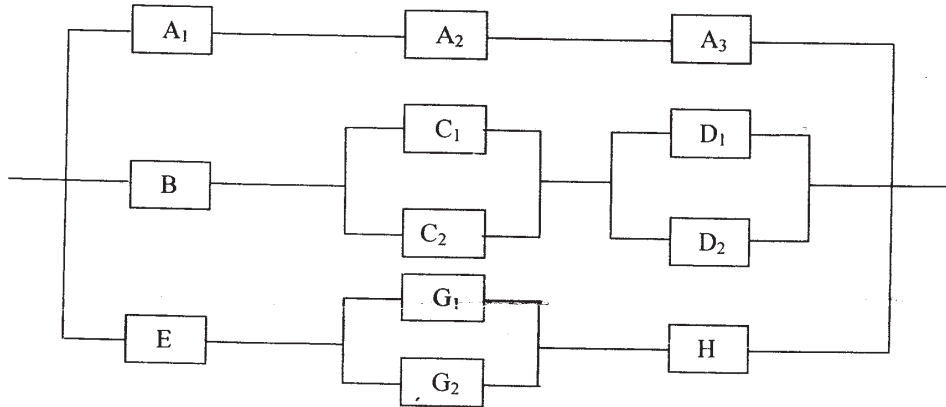
b) The fault tree for failure of a system is given below. Draw a block diagram and find the minimal cut sets. Find the reliability of the system if the probability of failure for different elements of system are as given below. Probability of failure of A is 0.01, Probability of failure of B is 0.02, Reliability of C is 0.97, Probability of failure of D is 0.02, Reliability of E = 0.97, Probability of failure of G = 0.01. [12]



OR

Q10)a) Explain the procedure for building Ishikawa diagram with a suitable example. [6]

b) Find minimal tie sets for the following configuration of the system and draw the fault tree for system failure. [12]



Q11)a) Write a note on Markov modelling. [6]

b) An engine shaft of 50 mm diameter is subjected to torsional mean stress of 220 MPa and standard deviation of 30 MPa. The shaft is made up of high alloy steel with a mean yield strength of 400 MPa and standard deviation of 65 MPa. Assuming normal distribution, find the reliability of the shaft with the help of a part of the standard normal table given below. How much is the central (average) factor of safety for the shaft? [10]

Z	2.47	2.48	2.49	2.50	2.51	2.52	2.53	2.54	2.55
$\phi(Z)$	0.9932	0.9934	0.9936	0.9938	0.9940	0.9941	0.9943	0.9944	0.9946

OR

Q12)a) Differentiate between Accelerated Life Testing and Highly Accelerated Life Testing. [6]

b) Failure data of 11 bulbs is given below. Use mean and median method to find reliability of bulbs and plot the graph between failure time and reliability for both methods. [10]

Bulb No	1	2	3	4	5	6	7	8	9	10	11
Failure Time Hrs	340	294	567	431	142	265	389	530	456	78	684

EEE

Total No. of Questions : 12]

SEAT No. :

P4437

[Total No. of Pages : 2

[4859]-502

B.E. (Mech.)

ALTERNATIVE ENERGY SOURCES

(2003 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the trends of utilization of alternative energy sources for power generation in the context of Indian energy demand. [10]
- b) Explain the term 'angle of declination'. Sketch its variation during one year. [8]

OR

- Q2)** a) Explain the following terms in solar radiation geometry using suitable diagrams. (i) Latitude (ii) Declination. (iii) Hour angle. (iv) Surface azimuth angle (v) Zenith angle. [10]
- b) Explain the term solar window. [8]

- Q3)** a) Explain the function of main components of a liquid flat plate collector with a neat sketch. Discuss the use of appropriate material for these components. [10]
- b) Describe the effect of various parameters on the efficiency of solar flat plate collector. [6]

OR

- Q4)** a) Determine the local solar time and declination at a location latitude $23^{\circ}15'N$, longitude $77^{\circ}30'E$ at 12.30. IST on June 19. Equation of time correction as given from standard table = $-(1'01'')$; take standard time longitude = $82^{\circ}30'$. [8]

P.T.O.

- b) Describe the standard procedure of testing for liquid flat plate collector. Draw and explain performance curves for it. [8]

- Q5)** a) Explain working of solar pond and effect of various parameters on its performance. [8]
b) Compare solar drying with natural drying, mentioning specific applications. [8]

OR

- Q6)** a) List various types of solar stills, with the help of a neat sketch, explain working of any one type. Showing various energy transfers. [8]
b) Explain construction and working of forced circulation solar dryer with the help of a neat diagram. [8]

SECTION - II

- Q7)** Compare solar PV system with solar thermal system with reference to ratings, applications and future prospects. [16]

OR

- Q8)** Discuss the applications of wind energy mentioning its advantages and limitations. [16]

- Q9)** State the types of geothermal fluids giving their suitable temperature range for power generation. Explain the schematic and thermodynamic cycle of any one type of geothermal power plant. [16]

OR

- Q10)** Explain the development of Fuel Cell Technology. Describe the SOFC with a neat sketch. [16]

- Q11)** Write explanatory notes on : [18]

- a) Dome type bio-gas plant.
b) Environmental protection norms ISO 14000.
c) Bio-gas for diesel engines.

OR

- Q12)** a) What is the basic principle of operation of tidal power plant? [18]
b) What are the different methods of obtaining energy from biomass?
c) Discuss the factors affecting performance of a bio-gas plant.



Total No. of Questions : 6]

SEAT No. :

P4429

[Total No. of Pages :2

[4859]-503

B.E. (E&TC) (Semester - I)

VOICE NETWORK

(2003Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Answer three questions from Section - I and three questions from Section-II.
- 2) Answer to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.

SECTION-I

- Q1)** a) Discuss the significance of redundancy in Stored Program Control Electronics Switching systems. How to attain the same in various configurations in switching systems. [6]
- b) Distinguish between single stage and multistage networks over at least four points. [4]
- c) Explain in detail various Subscriber loop signaling systems used in Telephone switching. [8]

OR

- a) Compare the common control and direct control. [5]
- b) With a neat diagram explain the principles of circuit switched and packet switched network. [8]
- c) Calculate the availability of dual processor system for a period of 08 years if its MTBF is 2800hours and MTTR is 6 hours. [5]

- Q2)** a) What is blocking probability? With the definition explain the “Erlang C” formula for the blocking probability, [8]
- b) A call processor in an exchange requires 120 ms to service a complete call. What is BHCA rating for the processor? If the exchange is capable of carrying 850 E of traffic, what is the call completion rate? Assume an average call holding time of three minutes. [8]

OR

- a) Explain Grade of service and Unavailability terms in details. [8]
- b) State and explain various measurement units used in traffic engineering. [8]

P.T.O.

- Q3)** a) Explain in detail B & D channel in ISDN. [8]
b) Discuss in detail the devices used in order to provide ISDN services. [8]

OR

- a) What are the services supported by ISDN. Explain them in with the help of diagram. [8]
b) Explain in detail architecture of ISDN and its objectives. [8]

SECTION-II

- Q4)** a) Explain cochannel interference reduction with directional antennas in cellular networks. [8]
b) Describe GSM logical channels in details with their hierarchy. [8]

OR

- a) Explain GSM subsystems in detail. [8]
b) Explain the normal burst and synchronization burst in GSM frame structure. [8]

- Q5)** a) Write short note on Walsh codes . [8]
b) Explain in detail why CDMA has better security than GSM? [8]

OR

- a) Compare IS-95 and CDMA-2000 system in detail. [8]
b) Describe various logical channels in CDMA with their significance. [8]

- Q6)** a) Explain the generation and detection of DTMF in detail. [10]
b) Discuss the Real time protocols used in VoIP. [8]

OR

- a) Explain the MEGACO/H.248 Protocol. [8]
b) What is VoIP? Explain any two applications of VoIP in detail. [10]



Total No. of Questions : 12]

SEAT No. :

P4439

[Total No. of Pages : 3

[4859] - 504

B.E. (E & TC)

**OPTICAL AND MICROWAVE COMMUNICATION
(2003 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Define and explain the following terms of fibers. **[8]**
- i) Critical angle
 - ii) Index profile
 - iii) Refractive index
 - iv) Numerical aperture
- b) State and explain the advantages and disadvantages of fiber optic communication system. **[8]**

OR

- Q2) a)** Compare the following terms. **[8]**
- i) Step index fiber and Graded index fiber
 - ii) Pin photodiode and Avalanche photodiode
- b) Compute the critical angle, numerical aperture, maximum entrance angle and number of modes for a given step index fiber, whose core diameter is 50 μm and having refractive index of core and cladding of 1.5 and 1.46 respectively. The outer medium is air with wavelength 0.82 μm . **[8]**

P.T.O.

- Q3)** a) What is dispersion? Explain intermodal dispersion and intramodal dispersion. [8]
- b) A multimode graded index fiber exhibits total pulse broadening of 0.1 μ sec over a distance of 12km. Calculate [8]
- i) The maximum possible bandwidth of the link assuming no intersymbol interference
 - ii) The pulse broadening per unit length
 - iii) The bandwidth length product of fiber

OR

- Q4)** a) Enlist the different splicing techniques? Explain anyone in detail. [8]
- b) Explain the working of OTDR with a neat diagram. What are the two important performance parameters of an OTDR? [8]
- Q5)** a) Explain the concept of Wavelength Division Multiplexing along with neat diagram. State the key features of the same. [8]
- b) Explain the basic structure of an STS-1 SONET frame, [6]
- c) Write a short note on 2 * 2 fiber coupler. [4]

OR

- Q6)** a) Write short notes on the following. [12]
- i) Optical amplifier
 - ii) Link power budget
- b) An optical fiber system is to be designed to operate an 8 km length without repeaters. The rise time of the chosen components are source LED 8ns, Fiber cable: Intermodal 5ns/km, Intramodal 1ns/km, Detector (p-i-n) 6ns. Estimate maximum bit rate that may be achieved on the link when using NRZ & RZ format. [6]

SECTION - II

- Q7)** a) For a 2.5 GHz, signal propagated in a rectangular waveguide of breadth 10 cm in the dominant mode. Calculate cut off wavelength, guide wavelength, the group and phase velocities. [6]
- b) Explain with a neat sketch any two applications of magic tee. [4]
- c) State and explain the performance parameters of directional coupler. [6]

OR

- Q8)** a) State and explain the properties of S parameter. [6]
b) Explain the construction and working of an isolator in detail. [6]
c) Explain power transmitted and power losses in a rectangular waveguide. [4]

- Q9)** a) Explain in detail the high frequency limitations on conventional tubes. Also explain the remedy to overcome the same. [8]
b) Enlist the different types of magnetron, Explain how mode jumping is avoided in magnetron. [6]
c) A helical slow wave structure has a pitch p of 2mm and a diameter of 4 cm. Calculate the wave velocity in axial direction of helix. [4]

OR

- Q10)** a) What are cross field devices? Explain how oscillations are sustained in cavity magnetron. Assume π mode of oscillations. [8]
b) A reflex klystron operates at the peak mode of $n = 2$ with $V_0 = 280V$, $I_0 = 22mA$ and a signal voltage $V_1 = 30V$. Determine: [6]
i) The input power
ii) The output power
iii) Efficiency
c) What is the need of slow wave structure? What are the types and which is the most common type? [4]

- Q11)** a) Explain the principle of operation, IV characteristic of microwave tunnel diode. [8]
b) Explain any two applications of the terrestrial microwave link in detail. [8]

OR

- Q12)** Write short notes on the following along with applications. [16]
a) Varactor diode
b) Microwave transistor
c) Modes of Gunn diode
d) Microstrip line



Total No. of Questions : 12]

SEAT No. :

P4440

[4859]-505

[Total No. of Pages : 2

B.E. (E & TC) (Semester - II)
SYSTEM PROGRAMMING AND OPERATING SYSTEM
(2003 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer-books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What do you understand by Grammar? Explain the use of terminal & non-terminal in representing grammar. [5]
b) List and Explain any one data structure used for language processing. [5]
c) Explain Scanning & Parsing. [8]

OR

- Q2)** a) Define following terms & explain where it is used with examples. [8]
i) DFA ii) Regular Expression
iii) Forward Reference iv) Back Tracking
b) Explain compilation of control structure for if and while statement. [4]
c) What is static and dynamic memory allocation? [6]

- Q3)** a) Differentiate : Expansion time loops and Execution time loops. [4]
b) Explain Positional Parameters. Keyword Parameters and Default Specification of Parameters. [6]
c) Enlist the different types of errors that are handled by PASS-I & PASS-II of a two PASS ASSEMBLER. [6]

OR

- Q4)** a) What is compiler? Describe the different phases of compiler in detail. [8]
b) Define macro & explain macro expansion with suitable example of nested macro. [8]

- Q5)** a) Why program relocation is required and how is it performed? [6]
b) Explain the five different types of editor with their applications? [10]

P.T.O.

OR

- Q6)** a) Explain the design of a direct linking loader. Also explain all required data structures. [8]
b) List down the components of a programming environment. Explain any two components in detail. [8]

SECTION - II

- Q7)** a) Explain functions of an Operating System. What are the basic services of an operating system. [9]
b) Draw and explain process state transitions. [5]
c) Explain preemptive and non preemptive concept with example. [4]

OR

- Q8)** a) What is deadlock? How deadlocks avoided in operating system. Explain it with suitable example. [10]
b) Write short notes on the following : [8]
i) Process Control Block ii) Critical Section

- Q9)** a) Give similarities and differences between paged and segmented memory management schemes. [10]
b) How virtual memory system is utilized in memory management? Explain in details. [6]

OR

- Q10)** a) Explain the file structure [8]
b) Explain the performance of demand paging. [8]

- Q11)** a) Explain the following : [8]
i) File directories.
ii) Disk ARM scheduling algorithm.
b) Draw and briefly explain fundamental file organization. [8]

OR

- Q12)** Write Short note on : [16]
i) Clock software
ii) File system and implementation with an example

❧❧❧❧

Total No. of Questions : 12]

SEAT No. :

P4443

[4859]-506

[Total No. of Pages : 3

B.E. (Civil)

FOUNDATION ENGINEERING

(2003 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4 from Q.5 or Q.6 from Section-I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12, from Section - II.
- 2) Answers to the two sections should be written in separate answer-books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Your answer will be valued as a whole.
- 6) Use of pocket calculator is allowed.
- 7) Assume suitable data if necessary.

SECTION - I

- Q1)** a) State the geophysical methods of soil exploration? Explain any one of them with a neat sketch. [6]
- b) Explain the factors on which the extent and depth of exploration of sub-soil deposit depends. [6]
- c) What is R.Q.D.? How quality of rock can be decided on R.Q.D.? During field exploration the core barrel was advanced 1.5 m during coring. The length of the core recovered was 0.98 m. What was recovery ratio? [6]

OR

- Q2)** a) Explain with a sketch procedure involved and specification for standard penetration test. [6]
- b) State the types of samples, samplers and explain how the samples are procured. [6]
- c) Exploration for selection of a dam site is to be carried out. Give your plan of sub-soil investigation. [6]
- Q3)** a) Explain in brief the plate load test and how the test results are used to find the bearing capacity of soil. [6]
- b) A normally consolidated clay layer of 3 m thickness has void ratio 0.6 and liquid limit 40%. Initial overburden pressure at centre of clay layer is 150 kN/m². Due to construction, this pressure is increased by 100 kN/m². Compute the consolidation settlement. [6]
- c) Enlist the causes of foundation settlement. [4]

P.T.O.

OR

- Q4)** a) A normally consolidated clay settled by 2 cm when the effective stress was increased from 100 kPa to 200 kPa. Calculate the settlement when the effective stress is increased to 400 kPa and 800 kPa. [6]
- b) Explain, with neat sketch, square root of time fitting method to find coefficient of consolidation. [6]
- c) Define preconsolidation pressure and explain with a sketch how you would determine the same. [4]

- Q5)** a) Explain with sketches types of bearing capacity failures. [6]
- b) Compute the safe bearing capacity of a square footing $1.5 \text{ m} \times 1.5 \text{ m}$, located at a depth of 1m below ground level in a soil of density 18 kN/m^3 . $\phi = 30^\circ$ ($N_c = 30.14$, $N_q = 18.4$, $N_T = 22.4$). If the water table rises to ground level, what is reduction in SBC. Take FS = 3. [6]
- c) Define the terms : ultimate, net and safe bearing capacity. [4]

OR

- Q6)** a) Derive Terzaghi's bearing capacity equation. [6]
- b) Determine the diameter of a circular footing to carry a concentric column load of 800 kN. The depth of footing is 1.0 m. The soil is partly saturated and has $\phi = 10^\circ$, $c = 50 \text{ kN/m}^2$ and $\gamma = 18 \text{ kN/m}^3$. Use a factor of safety of 3. For $\phi = 10^\circ$. take $N_c = 8.3$, $N_q = 2.5$ and $N_\gamma = 1.4$. [6]
- c) Explain perimeter shear concept as suggested by Housel. [4]

SECTION - II

- Q7)** a) Describe in detail the five fold classification of piles with examples and sketches of each. [6]
- b) Discuss how would you calculate settlement of group of piles embedded in normally consolidated clays. [6]
- c) Describe the merits and demerits of pier foundation. [6]

OR

- Q8)** a) Explain cyclic plate load test. [6]
- b) Draw neat sketches of components of double D shaped well in plan and section and explain the function of various components with sketches. [6]
- c) State and describe the different dynamic formulae for pile capacity determination. [6]

- Q9)** a) Describe swelling pressure test. [6]
b) Explain with a sketch the concept of stability of bottom of strutted excavation. [6]
c) Explain with sketch components of an under-reamed pile. [4]

OR

- Q10)** a) Sketch the distribution of pressure and deflection pattern for cantilever sheet pile in cohesive soil retaining non-cohesive back fill. [6]
b) Why is black cotton soil termed as 'treacherous' soil. [6]
c) Distinguish between cantilever and anchored sheet pile. [4]

- Q11)** a) Explain with sketches different types of seismic waves. [8]
b) What are seismic hazards? Name them. And describe the effects of liquefaction on built environment. [8]

OR

- Q12)** a) Explain the different functions served by geotextiles and explain the use of geotextile as drainage/filter in detail. [8]
b) Describe the applications of reinforced soil for structures with vertical faces and for embankments. [8]



Total No. of Questions : 12]

SEAT No. :

P3232

[Total No. of Pages : 2

[4859] - 507

B.E. (Computer Engineering) (Semester - II)
SOFTWARE TESTING AND QUALITY ASSURANCE
(2003 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answers to the two sections should be written in separate answer-book.*
- 2) From section I answer (Q1 or Q2) and(Q3 or Q4) and(Q5 or Q6).*
- 3) From section II answer (Q7 or Q8) and(Q9 or Q10) and(Q11 or Q12).*
- 4) Assume suitable data jf necessary.*
- 5) Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain representation theory of Measurement. **[10]**
b) Explain Objectives of software Measurement. **[8]**

OR

- Q2)** a) ExplainCMM levels in details. **[8]**
b) Explain how to apply the framework in software quality measurement. **[10]**

- Q3)** a) Write a note on following : **[8]**
i) Functionality
ii) Complexity
b) Explain Modularity and Information flow attributes. **[8]**

OR

- Q4)** a) Explain what is good data, how to store and Extract data. **[8]**
b) Explain Object oriented Metrics. **[8]**

P.T.O.

- Q5)** a) Explain Incremental testing strategy. [10]
b) Enlist difference between Black box and White box testing. [6]

OR

- Q6)** a) What is defect, Defect classes and Defect Repository. [6]
b) What Goal-Question-Metric Model. [10]

SECTION - II

- Q7)** Write short note on : [18]
a) Usability Testing
b) Ad-hoc Testing
c) Regression Testing

OR

- Q8)** Write short note on : [18]
a) Execution and Reporting
b) Specification Based Testing
c) Performance testing

- Q9)** a) Write in details about Ishikawa's Basic tools. [8]
b) Define Quality, Quality control and assurance and cost of quality. [8]

OR

- Q10)** a) Explain effects of ISO quality model on software quality. [8]
b) Explain software Audit and its significance. [8]

- Q11)** a) Explain role of support Analysis. [8]
b) Explain Challenges and best practices in Problem reporting. [8]

OR

- Q12)** a) Explain Logistic and Tooling in Problem reporting. [7]
b) Explain problem Resolution. [9]



Total No. of Questions : 12]

SEAT No. :

P1959

[Total No. of Pages : 3

[4859] - 51

**B.E. (Mechanical) (Semester - II)
CRYOGENICS ENGINEERING
(2008 Pattern) (Open Elective)**

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Answer any three questions from each section.*
- 2) *Answer for the two sections should be written in separate answer book.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of pocket calculator & different gas charts as applicable is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

Unit - I

- Q1)** a) Define Cryogenics and discuss how it is different from refrigeration. State important applications of Cryogenics. [6]
- b) Write a short note on History of Cryogenics. [6]
- c) What are permanent gases? State boiling points for the gases viz. Helium, Hydrogen, Nitrogen, Oxygen. [6]

OR

- Q2)** a) Explain with neat sketch Super-fluidity phenomena observed in case of liquid Helium. [6]
- b) Explain effect of Cryogenic temperature on Thermal properties of material. [6]
- c) Explain the effect of Cryogenic temperature on mechanical strength of materials. [6]

Unit - II

- Q3)** a) Explain ideal liquefaction system and different parameters used to define the system performance. [6]

P.T.O.

- b) Draw Simple Linde Hampson system and label all the components. [4]
- c) Explain inversion curve with neat diagram. What is maximum inversion temperature? [6]

OR

- Q4)** a) Why Pre cooling is necessary in case of Precooled Linde Hampson system? [6]
- b) Compare Isenthalpic and Isentropic expansion methods employed for cooling. [6]
 - c) Discuss how Cryogenic liquefaction system is different from Cryogenic refrigeration system. [4]

Unit - III

- Q5)** a) State importance of regenerator effectiveness in Stirling cycle refrigerator. [8]
- b) Explain with neat sketch Philips Refrigerator. [8]

OR

- Q6)** a) What are the different techniques employed for separating of gases. [8]
- b) Explain Gifford McMahon Refrigerator with neat sketch. [8]

SECTION - II

Unit - IV

- Q7)** a) State various insulations used in Cryogenics in increasing order of performance explain any one. [6]
- b) Explain with neat sketch principle of rectification column. [10]

OR

- Q8)** a) Explain the theoretical plate calculations using McCabe-Thiele technique. [8]
- b) Compare Cryogenic separation with other gas separating methods. [8]

Unit - V

- Q9)** a) Discuss various methods used to drain liquid from Dewar vessel. [6]
- b) Explain construction of Dewar vessel with neat sketch stating function of each component. [12]

OR

- Q10)a)** Discuss the role of Vacuum in Cryogenic. [6]
b) What are the different safety devices installed on a Dewar Vessel. [12]

Unit - VI

- Q11)a)** Explain the Meissner effect and state its applications. [6]
b) What are the different present day applications of Cryogenics in the medical field. [6]
c) What are different applications of Cryogenics in the field of Space Technology. [4]

OR

- Q12)a)** Explain any two of following present day applications of Cryogenics in the field [10]
i) Food preservation.
ii) High Energy Physics.
iii) Gas industry.
b) Explain the Cryogenics principle used in recycling of automobiles tyres. [6]



Total No. of Questions : 8]

SEAT No. :

P1710

[Total No. of Pages 2

[4859]-52

B.E. (Mechanical)

d- PRODUCT LIFE CYCLE MANAGEMENT (Open ElectiveII)

(2008 Course)(Semester -II) (Elective-IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION- I

- Q1)** Explain the concept of Product Life Cycle Management in Detail .
Comment why PLM has emerged? **[18]**
- Q2)** Discuss various elements of PLM in detail. **[16]**
- Q3)** Discuss how PLM has emerged from EDM and PDM **[16]**
- Q4)a)** Explain various external & internal drivers demanding implementation of PLM **[8]**
- b) Compare PLM to Engineering Resource Planning. **[8]**

SECTION II

- Q5)** Explain the concept of Product Life Cycle management system. Explain Different types of systems and system models. **[18]**
- Q6)** Discuss the link between Product Data and Product Workflow. Discuss various key issues with Product Data **[16]**

P.T.O.

Q7) Explain Various phases of Product Life Cycle and Corresponding Technologies involved. **[16]**

Q8) Discuss Visualization, Collaboration, data vaults and content management. **[16]**



Total No. of Questions :12]

SEAT No. :

P1711

[4859]-55

[Total No. of Pages :6

B.E. (Mechanical Sandwich)
MACHINE & COMPUTER AIDED DESIGN (MCAD)
(2008 Pattern) (Semester - I)

Time : 4 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer- book.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator tables is allowed.*
- 6) *Assume suitable data, wherever necessary.*

SECTION - I

- Q1)** a) Derive the expression of beam strength of straight bevel gear tooth. How is the wear strength expression modified for straight bevel gear. [8]
- b) A pair of straight bevel gear with 20 pressure angle consist of 20 teeth pinion meshing with 30 teeth gear. The module is 4 mm while the face width is 20mm. The pinion and gear material has surface hardness of 400 BHN. The pinion rotates at 720 rpm and receives 3 kW power from a motor. Taking service factor of 1.5 and Barth's factor for dynamic loading. Determine factor of safety in pitting. [8]

OR

- Q2)** a) Derive expression for Efficiency of Worm & Worm Gear Drive. [4]
- b) A double start worm made of case hardened alloy steel 16Ni80Cr60 ($S_{ut}=700\text{N/mm}^2$) is to mesh with worm gear to be made of phosphor bronze ($S_{ut}=240\text{N/mm}^2$). The gear pair is required to transmitted 5kW power from an electric motor running at 1500 rpm to a machining running at 75rpm. The service factor is 1.25, while the factor of safety required is 2. The face width of the worm gear is 0.73 times the pitch circle diameter of worm. The worm gear factor is 0.685 N/mm^2 , while the

P.T.O.

diametrical quotient is 10. The normal pressure angle is 14.5° if the coefficient of friction between worm and worm gear teeth is 0.03, Design the gear pair and find power lost. Would you recommend the fan for gear box? Assume the permissible temperature rise 50°C . [12]

Use following data

$$\text{Lewis form factor } Y = 0.39 - \frac{2.15}{Z_G},$$

$$\text{Velocity factor } C_v = \frac{6}{6 + V_G}$$

$$\text{Area of Housing } A = 1.14 \times 10^{-4} \times (a)^{1.7} \text{ m}^2$$

Where a = centre distance.

- Q3)** a) What are the Methods of Pre-stressing of thick cylinder? Explain any one. [6]
- b) An air receiver consists of a cylindrical shell of an internal diameter 1m and length 2m, closed by hemispherical heads. The air pressure inside the vessel is limited to 15 bar. The shell as well as ends are made of plain carbon steel with an ultimate tensile strength of 390N/mm^2 . The efficiencies of the circumferential and longitudinal welded joint in the vessel shell are 80% and 85% respectively. The efficiency of the welded joints in the hemispherical head is 80%. Determine [12]
- The thickness of the vessel shell;
 - The thickness of the hemispherical head;
 - The storage capacity of the vessel.

OR

- Q4)** a) Explain the various categories of the welded joints used in unfired pressure vessel. [6]
- b) A hydraulic cylinder made of gray cast iron FG300 is subjected to internal pressure 15 MPa. If the inner and outer diameter of cylinder are 200mm and 240mm respectively. Determine factor of safety.
- If the cylinder pressure is further increased by 50%, what will be the factor of safety. [12]

- Q5) a)** Explain the basic principle of DFME. **[4]**
- b) Cantilever beam is made of plain carbon steel 25C8 having the mean yield strength of 280 N/mm^2 and a standard deviation of 20 N/mm^2 . Determine: **[12]**
- i) The reliability of the beam;
 - ii) The minimum factor of safety available; and
 - iii) The average factor of safety available.

From the table for the areas below the standard normal distribution take:

$$A1 = 0.4875 \text{ and } A2 = 0.5.$$

OR

- Q6) a)** Explain the aesthetic and ergonomics design principle of car steering wheel with a priority sequence. **[8]**
- b) Explain factors to be considered while designing the component for Casting. **[8]**

SECTION - II

- Q7) a)** Explain the procedure to estimate power requirement for belt conveyors. **[6]**
- b) A belt conveyor is to be design to carry the bulk material at the rate $300 \times 10^3 \text{ kg/hr}$ with following details: **[12]**

Bulk density of material	= 800 kg/m^3
Angle of response of bulk material	= 15°
Belt speed	= 10 km/hr
Material factor for plies, k_1	= 2.0
Belt tension and arc of contact factor, k_2	= 63
No. of plies for the belt	= 4

Determine:

- i) The suitable width of the length
- ii) Diameter of the drive pulley
- iii) Length of the drive pulley

OR

Q8) a) What is adequate design and optimum design? Explain with the suitable example. **[6]**

b) A shaft is to be used to transmit the torque of 1500 Nm. The required torsional stiffness of the shaft is 100 Nm/degree, while the factor of safety based on yield strength in shear is 2.0. Using the maximum shear stress theory design the shaft objective of minimising the weight, out of the following materials: **[12]**

Material	Weight density $w, \text{N/m}^3$	Tensile Yield strength S_{yt} , N/mm^2	Modulus of Rigidity $G, \text{N/mm}^2$
Chromium Steel	77×10^3	420	84×10^3
Plain Carbon Steel	76.5×10^3	230	84×10^3
Titanium alloy	44×10^3	900	42×10^3
Magnesium Alloy	17.5×10^3	225	15×10^3

Q9) a) Figure 1 shows a cluster of four springs. One end of the assembly is fixed and a force of 1000N is applied at the end. Using finite element method, Determine:

- i) Deflection of each spring.
- ii) The reaction forces at support. **[8]**

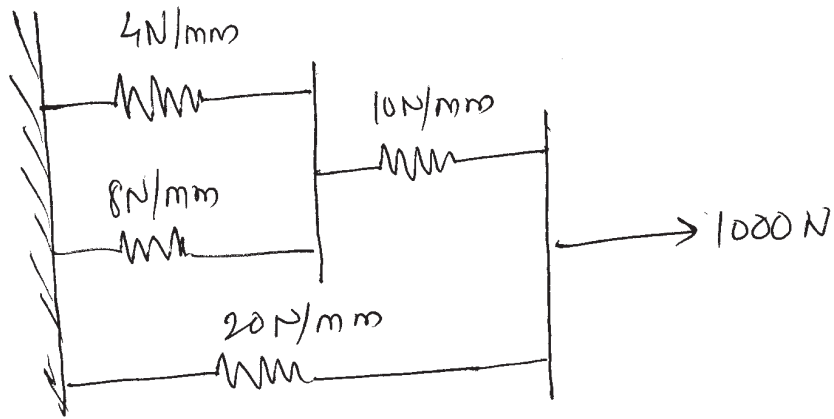


Figure 1

- b) Explain the Galerkin approach of element stiffness Matrix. [8]

OR

- Q10)a) A two member truss is as shown in figure 2. The cross-sectional area of each member is 200 mm^2 and modulus of elasticity is 200 GPa . Determine the deflection, reaction and stresses in each of the members. [10]

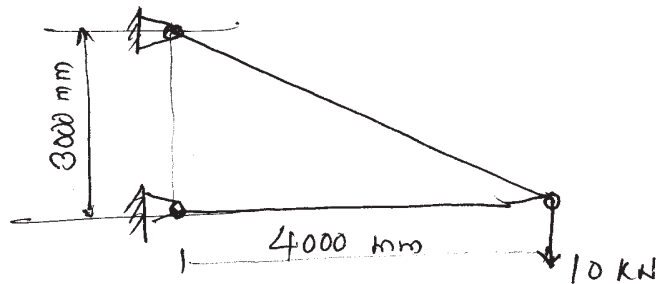


Figure 2

- b) Determine shape function N_1 , N_2 and N_3 at the point P for the triangular element as shown in figure 3. [6]

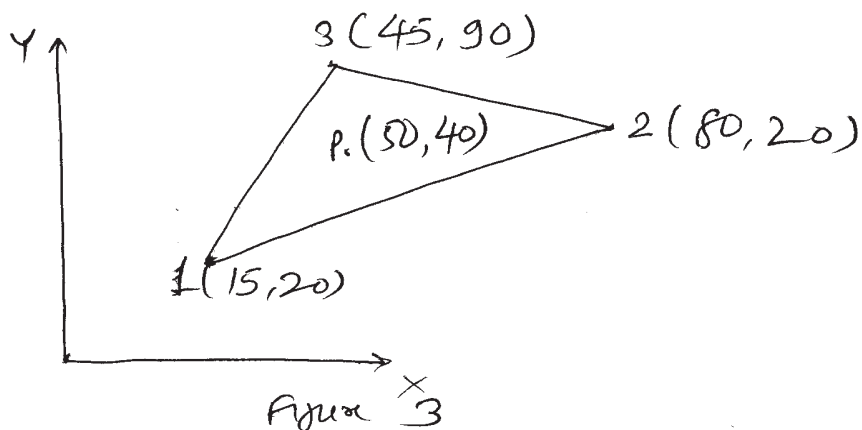


Figure 3

- Q11)a)** State the comparison between NC and CNC machines. [6]
- b) Write a manual part program to finish the stepped shaft in the $\phi 50$ mm section as shown in figure. Assume spindle speed as 400 rpm and feed rate as 0.5 mm/rev. [10]

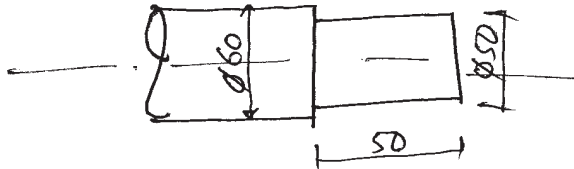


Figure 4

OR

- Q12)a)** Write major advantages and Disadvantages of Computer Integrated Manufacturing (CIM). [8]
- b) Discuss the significance of flexibility in automation system. [4]
- c) What are the features of FMS layout configurations? [4]

EEE

Total No. of Questions :12]

SEAT No. :

P1712

[4859]-57

[Total No. of Pages :3

B.E. (Mechanical Sandwich)
INDUSTRIAL HYDRAULICS AND PNEUMATICS
(2008 Course) (Semester - I) (402062)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

- Q1)** a) State and explain Pascal's Law. How it is applied to Hydraulic and Pneumatic systems? [8]
- b) Explain as many as possible, various terms used in Hydraulics and Pneumatics. [8]

OR

- Q2)** a) Explain the role of filter and its types according to location in a hydraulic system. [8]
- b) Write and explain in detail, applications of hydraulic systems used in Construction industry. [8]
- Q3)** a) Explain with neat sketch, constructional details of a balanced vane pump. [8]
- b) Select components of a hydraulic power unit for typical application. Explain constructional details of Hydraulic power unit with the help of a neat diagram. [8]

OR

P.T.O.

- Q4) a)** Explain: [8]
- i) Principle of working of positive displacement pump.
 - ii) Effects of cavitations and aeration on pump operation.
- b) Analyze, performance curves shown in Figure 1. of a typical pump. [8]

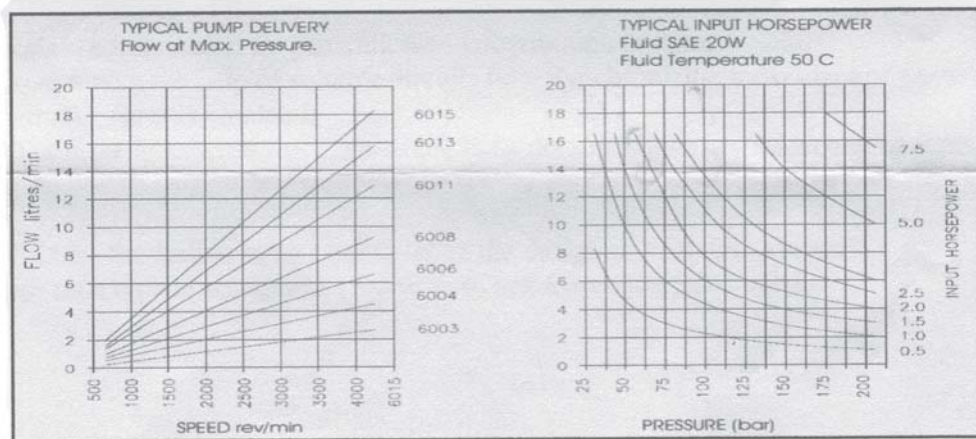


Figure 1

- Q5) a)** Explain, how Accumulator size is determined for different operating conditions? [9]
- b) Explain minimum four applications of Accumulator with neat circuit diagrams. [9]

OR

- Q6) a)** Explain central positions of direction control valves used in hydraulics along with their respective applications. [9]
- b) How Pilot operated direction control valves are different than manual and Mechanical? Explain with applications. [9]

SECTION - II

- Q7) a)** Draw and explain Regenerative Circuit. [8]
- b) Draw and explain hydraulic circuit for cylinders synchronization. Prove that $P_1 A_{p1} = F_1 + F_2$. Where P_1 and A_{p1} are pressure and piston end area of first cylinder and F_1 and F_2 are forces acting on cylinders respectively. [8]

OR

Q8) a) Draw and explain hydraulic circuit for any industrial application of your choice. [8]

b) What is the Mounting of a cylinder? Explain different ways of mountings. [8]

Q9) a) Explain with neat sketch pneumatic clamp. [8]

b) Differentiate between pneumatic and electro-pneumatic systems. [8]

OR

Q10)a) Analyze the circuit shown in Figure 2. [8]

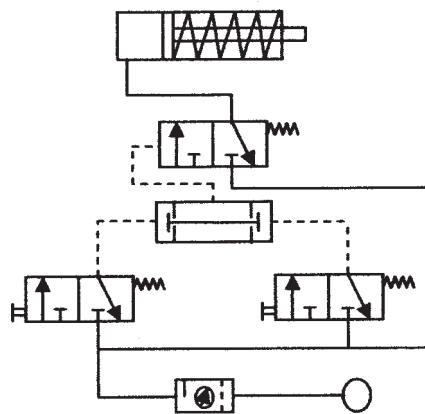


Figure 2

b) Explain compression air generation and distribution system. [8]

Q11)a) Explain with the help of suitable circuits how Synchronizing movement of hydraulic rams is obtained. [9]

b) What is the manufacturers Catalogue? How does the Designer select components through it? [9]

OR

Q12)a) What are the factors to be considered in the design of hydraulic system? [9]

b) Explain a typical set-up and procedure to test a pressure relief valve. [9]

EEE

Total No. of Questions : 12]

SEAT No. :

P1713

[4859]-58

[Total No. of Pages : 3

B.E. (Mech.Sandwich)

a-REFRIGERATION AND AIR CONDITIONING

(2008 Course) (Elective-II) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator psychrometric charts and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Write a note on 'Evaporative Refrigeration. [6]
b) Explain concept of DART. [3]
c) Explain 'Boot Strap' system with the help of neat sketch and T-S diagram.[7]

OR

- Q2)** a) Explain 'Reduced ambient' system with a neat sketch and T-S diagram.[7]
b) What is necessity of air craft refrigeration? [3]
c) Write a note on 'vortex tube refrigeration'. [6]

- Q3)** a) Explain: i) ODP, ii) GWP and iii) TEWI [8]
b) Write a note on 'Selection of refrigerants'. [5]
c) How refrigerants are classified? [3]

OR

- Q4)** a) Discuss: Desirable properties of refrigerants. [8]
b) Explain: [6]
i) Recycling
ii) Recovery and
iii) Redaiming of Refrigerants.
c) Name the materials used in refrigerant piping. [2]

P.T.O.

- Q5)** a) Derive an expression for COP of an ideal 'vapour absorption cycle'. [4]
b) Explain Electrolux refrigeration with a neat sketch. [6]
c) Explain cascade system with a neat sketch and p-h diagram. [8]

OR

- Q6)** a) With a neat sketch, explain 'Lithium Bromide absorption system. [8]
b) Explain two stage compression with flash gas removal. [6]
c) In an absorption system, heating, cooling and refrigeration take place at the temperatures of 150°C, 30°C and -20°C. Find the theoretical COP of the system. If the generator temperature is increased to 200°C and evaporator temperature is decreased to -40°C, find the percentage change in theoretical COP. [4]

SECTION - II

- Q7)** a) Explain with a neat sketch variable air volume system. Represent it on psychrometric chart. [9]
b) For a room air conditioning, following are the observations. [7]
i) Room temperature = 27°C DBT, 50%.RH.
ii) Room sensible heat gain = 26kw
iii) RSHF = 0.84.
Find
i) Room latent heat gain
ii) ADP
iii) CMM of air to be supplied at ADP and
iv) CM and specific humidity of air if it is supplied to the room at 16°C.

OR

- Q8)** a) Explain: RSHF, GSHF & ERSHF as applied to air conditioning. Mention their importance. [6]
b) Write a note on automobile air conditioning system. [4]
c) With a neat sketch, explain single-zone central air conditioning system. [6]

- Q9) a)** Explain with a neat diagram 'oil pressure failure control' used in refrigeration equipment. [8]
- b) Draw and explain hot gas bypass method used for capacity control of reciprocating compressors. [8]

OR

- Q10) a)** In case of duct design of air-conditioning, prove that equivalent diameter for rectangular duct for same air flow is given by $Deq = 1.265 \left[\frac{a^3 b^3}{a+b} \right]^{0.2}$ with usual notations. [10]
- b) A rectangular duct of section 600mm x 400mm size is used to convey air of density 1.12 kg/m³ at 1.3m³/s of flow rate. Determine the equivalent diameter of circular duct if. [6]
- In both cases, quantity of air conveyed is same.
 - Velocity of air is same and
 - Find the pressure loss if $f=0.001$ for the metal construction of duct, per 100m length of the duct.

- Q11) a)** Write in detail the factors to be considered in cold storage design used for food storage. [6]
- b) What are the salient features of transport refrigeration? [6]
- c) Name different food preservation methods and explain any one method in detail. [6]

OR

- Q12) a)** Explain cryogenic air separation plant with a neat sketch. [6]
- b) Explain 'claude cycle'. [6]
- c) Explain the applications of cryogenics. [6]



Total No. of Questions : 12]

SEAT No. :

P3624

[Total No. of Pages : 3

[4859] - 59

B.E. (Mechanical/Sandwich)
COMPUTATIONAL FLUID DYNAMICS
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, Mollier charts, electronic calculator is allowed.*
- 6) *Your answer will be valued as a whole.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Why is it important to correctly define the computational domain for the fluid flow problem? Explain with suitable examples. [10]
b) Explain significance of substantial derivative to describe the physics of flow, mathematically. [6]

OR

- Q2)** a) How is CFD being used in the Civil and environmental industry? [8]
b) Write a force balance equation for all the forces acting on a differential control volume. [8]

- Q3)** a) Name the sources of energy that contribute to the energy equation.[9]
b) Given the function $f(x) = 0.25x^2$ find the first derivative off (x) at $x = 3$; using forward, backward and central differencing of order (Δx). Use a step size of $\Delta x = 0.1$. [9]

OR

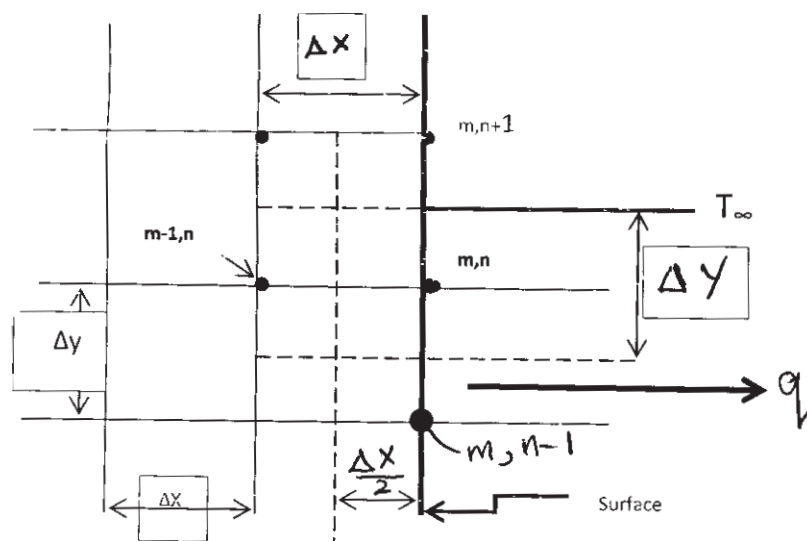
P.T.O.

- Q4)** a) Apply Fourier's law of heat conduction to obtain the heat flux in the X-direction. [10]
 b) Obtain the general analytical solution for Laplace's equation for a one dimension case. [8]
- Q5)** a) What is the difference between using a direct method and an iterative method to solve the discretized equations? [6]
 b) Is finite difference more suitable for structured or unstructured mesh geometries? Why? [12]

OR

- Q6)** a) What is the technique associated with the successive over-relaxation and why is it used? [8]
 b) Derive an expression for the equation of a boundary node subjected to a constant heat Flux from the environment. Use Fig.6(B) shown below for nomenclature. [10]

Fig.6(B)



SECTION - II

- Q7)** A plane wall of thickness δ has its surfaces maintained at temperature T_1 and T_2 . The wall is made of a material whose thermal conductivity varies with temperature according to the relation $k = k_0 T^2$. Derive an equation to determine the temperature distribution by steady state heat conduction through the wall. [16]

OR

- Q8)** a) Discuss various aspects of the explicit and implicit finite difference approach. [8]
b) How does time step affect stability, explain with suitable example. [8]

- Q9)** a) Describe the following types of grids : [16]
i) Boundary fitted grid.
ii) Staggered grid.
iii) Structured grid.
iv) Unstructured grid.

OR

- Q10)**a) Considering the steps of SIMPLEC algorithm, justify the need for this algorithm. [8]
b) Describe the pressure correction approach incompressible viscous flow. [8]

- Q11)**a) Explain temporal marching two dimensional method for inviscid flow. [8]
b) Justify the need of artificial viscosity to solve Navier Stoke equation. [8]

OR

- Q12)** Write short notes on any two : [16]
a) Finite Difference method.
b) Finite Volume method.
c) Errors resulting in numerical solution.
d) CFL criteria of stability.



Total No. of Questions : 12]

SEAT No. :

P1679

[4859]-6

[Total No. of Pages : 2

B.E. (CIVIL)

**AIR POLLUTION AND CONTROL
(2008 Course) (Semester - I) Elective-I**

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) *Answers to the two sections should be written in separate answer-books.*
- 2) *Your answer will be valued as a whole.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Answer any three questions from section I and any three questions from section-II.*

SECTION - I

Q1) Discuss the following:

- a) Gaussian diffusion model. [6]
- b) Temperature lapse rate. [5]
- c) Metrological parameter. [6]

OR

Q2) a) Determine the effective height of stack, given the following data. [9]

- Physical stack is 180 m tall with a 0.95-m inside diameter.
- Wind velocity is 2.75 m/s.
- Air temperature is 20°C.
- Barometric pressure is 1000 millibars.
- Stack gas velocity is 11.12 m/s.
- Stack gas temperature is 160°C.

b) Explain plume behavior with neat sketch. [8]

Q3) a) Explain in detail how air pollution survey is carried out? [8]

b) What is stack emission monitoring? How it is carried out? [8]

OR

Q4) a) What are the different instrumental methods for analysis of air sampling? Explain any one in detail. [8]

b) What are different ambient Air Quality standards? Explain Ambient air quality monitoring? [8]

P.T.O.

- Q5) a)** What is mean by air pollution? What are its sources and effects? [9]
b) Explain the method for controlling indoor air pollution in brief? [8]

OR

- Q6) a)** What is mean by odour pollution? Give its sources and measurements?[9]
b) How odour pollution can be controlled? Explain any one in detail. [8]

SECTION - II

- Q7) a)** Write short note on: [10]
i) Process equipment and process operation.
ii) Control of air pollution by fuels.
b) What are the specific air pollution control devices are available for control of particulate emissions at their source? Indicate the size range of the particulate that each type of unit is capable of removing efficiency. [7]

OR

- Q8) a)** Explain the control of air pollution from automobiles. [5]
b) Explain what is process modification? How it will helpful in controlling air pollution. [6]
c) Explain with neat sketch in detail about settling chamber. [6]

- Q9) a)** What is mean by land use planning? Explain in detail. [8]
b) Explain benefit ration and optimization for control of air pollution? [8]

OR

- Q10)a)** Explain environment protection act (1986) in detail. [8]
b) What are various national Ambient Air Quality Standards. [8]

- Q11)a)** Explain the methodology for preparing environ mental impact assessment in detail. [9]
b) What is the role of regulatory agency and control boards for environmental clearance for projects? [8]

OR

- Q12)a)** Explain the role of environment in thermal power plant. [8]
b) What are the environmental rules 1999 for sitting of industries. [9]



B.E. (Mechanical-Sandwich)
c-FINITE ELEMENT METHOD
(2008 Course) (Semester - I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) Solve Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6 from section-I and Q.7 or Q.8,Q.9 or Q.10,Q.11 or Q.12 from section-II.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Draw neat diagrams wherever necessary.
- 4) Assume suitable data wherever necessary.
- 5) Figures to the right indicate full marks.
- 6) Use of calculator is allowed.

SECTION - I

- Q1) a)** List at least six advantages of finite element method over analytical method. Also list disadvantages or limitations of FEM. [8]
- b) Explain procedural steps involved in FEM. [8]

OR

- Q2) a)** Write short note on [8]
- i) Principle of minimum potential energy
 - ii) Galerkin's method
- b) A system of spring as shown in fig 2b. One end of the assembly is fixed and a force of $P=1000$ N is applied at the other end. Using finite element method, determine [8]
- i) The stiffness matrix of each element
 - ii) The global stiffness matrix
 - iii) The deflection of each spring
 - iv) The reaction force at support.

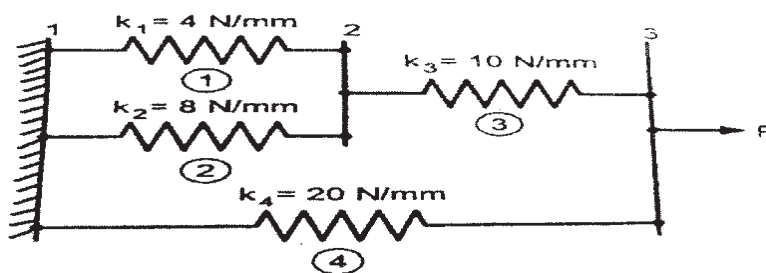


Fig. 2b

Q3) a) What is shape function? Obtain the shape function in terms of natural coordinates of two noded 1D element. [8]

b) Consider the bar as shown in fig 3b. An axial load of $P=200 \times 10^3$ N is applied as shown. Determine [10]

- i) Stiffness matrix of each element
- ii) Global stiffness matrix
- iii) Nodal displacements
- iv) Stresses in each element
- v) Reaction forces.

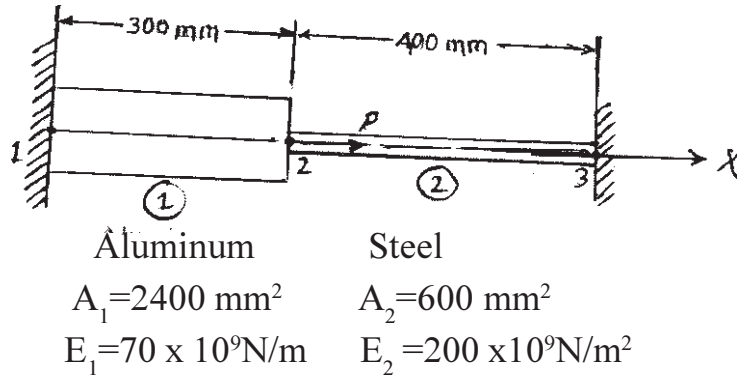


Fig:3b

OR

Q4) a) The three bar truss made of steel ($E=200 \times 10^3$ N/mm²) is subjected to the horizontal forces of 30000N and 20000N and the vertical force of 10000N as shown in the fig 4a. The cross-sectional area is 300 mm² for each element. Using finite element method, determine [10]

- i) Stiffness matrix for each element
- ii) Global stiffness matrix
- iii) Nodal displacement
- iv) Stresses in each element
- v) The reaction forces at the support

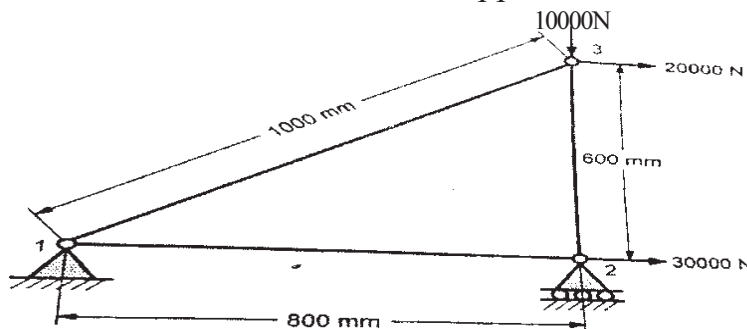


Fig.4a

b) Derive an expression for elemental stiffness matrix for truss element. [8]

- Q5) a)** What is an isoparametric element? Explain with suitable example. [6]
- b)** In a quadrilateral plate, the four vertices 1, 2, 3 and 4 have the cartesian coordinates (2, 3), (6, 2), (5, 7) and (3, 6) respectively. The temperatures at the four corners 1, 2, 3 and 4 are 40°C, 20°C, 25°C and 30°C respectively. For a point p (5, 4) within the plate, determine: [10]
- The natural coordinates
 - Shape functions
 - Temperature

OR

- Q6) a)** What is CST element? Explain the shape function of CST element. [6]
- b)** For the triangular element as shown in fig. 6b the nodal values of displacements at node 1, 2 and 3 are (2, 1), (3, 2) and (5, 3) respectively. For point (2, 2) within the element, determine [10]
- The natural coordinates
 - The shape functions
 - The displacements.

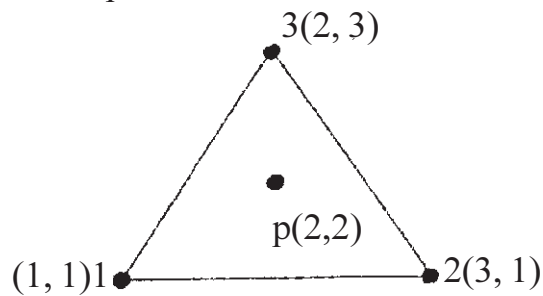


Fig. 6b

SECTION-II

- Q7) a)** A concentrated load of $P=50$ KN is applied at the centre of a fixed beam of length 3m, depth 200mm and width 120mm. Calculate the deflection and slope at the midpoint. Assume $E=2 \times 10^5$ N/mm². [10]

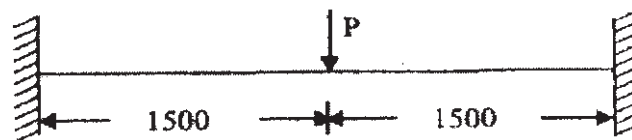


Fig. 7a

- b)** Explain potential energy approach to derive beam element equations. [6]

OR

- Q8)** a) Derive stiffness matrix of beam element. [8]
b) Explain Hermite shape function of beam element. [8]

Q9) The fin as shown in fig. 9a is insulated on the perimeter. The left end has a constant temperature of 100°C . A positive heat flux of $q=5000\text{ W/m}^2$ acts on the right end. Let $K_{xx}=6\text{ W/m}^{\circ}\text{C}$ and cross-sectional area $A=0.1\text{ m}^2$. Determine the temperatures at $L/4$, $L/2$, $3L/4$ and L , where $L=0.4\text{m}$ [16]

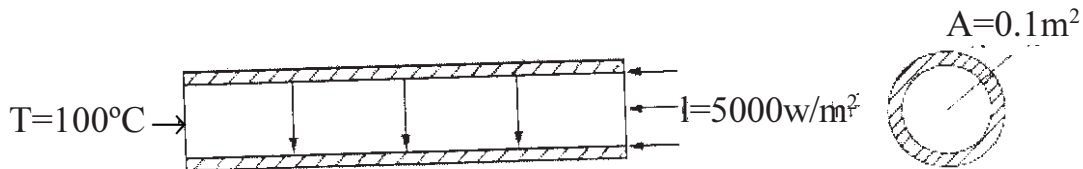


Fig.9

OR

- Q10)** a) Write short note on point sources in heat transfer problems. [8]
b) Derive element stiffness matrix formulation for one dimensional steady state Heat conduction problems. [8]

- Q11)** a) Explain modal analysis and mode shapes. [6]
b) Explain in brief static and dynamic analysis. [6]
c) Explain the types of nonlinearities in FEM. [6]

OR

- Q12)** Write short notes on (any three): [18]
a) Modal analysis
b) Fatigue analysis
c) Crash analysis
d) NVH analysis



Total No. of Questions : 12]

SEAT No. :

P1715

[Total No. of Pages :3

[4859]-61

B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING

(Semester -I) (2008 Course) (Elective -III) (402064 A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION -I

Q1) a) Sketch and explain the following layouts: **[10]**

- i) Transverse front mounted engine and front wheel drive
 - ii) Longitudinal front mounted engine and rear wheel drive
- b) Compare the merits and demerits of the frameless construction with the conventional frame construction. **[6]**

OR

Q2) a) Explain the following terms with the help of neat sketch **[10]**

- i) Air resistance
 - ii) Rolling resistance
 - iii) Grade resistance
- b) Explain with neat sketch the construction of typical truck chassis frame. **[6]**

Q3) a) With the help of neat sketch explain the operation of diaphragm spring clutch. **[8]**

- b) Explain with neat sketch operation of torque tube drive. **[6]**
- c) Explain the need of universal joint in propeller shaft. **[4]**

OR

P.T.O.

- Q4)** a) Explain with neat sketch the working of sliding mesh gear box. [8]
b) With the help of neat sketch explain the operation of full floating rear axle. [6]
c) Describe the operation of non-slip or limited slip differential used in automobile. [4]
- Q5)** a) Explain with neat sketch independent suspension system. [8]
b) Explain with neat sketch the working of disc brake. [6]
c) What is the requirement of wheel balancing? [2]

OR

- Q6)** a) Explain with neat sketch the working of Hydraulic power steering. [8]
b) What are the advantages of tubeless tyre over tubed tyre? [4]
c) What are the different factors contributing to A/C load in car? [4]

SECTION-II

- Q7)** a) What do you understand by servicing of brake system? Prepare the check point list for servicing of brake system. [8]
b) Describe the maintenance required for [8]
i) Steering system
ii) Tyres

OR

- Q8)** a) Classify the various systems of engine lubrication. Draw flow diagram of oil showing various parts in a pressure feed system. [8]
b) Differentiate between following: [8]
i) Periodic maintenance and breakdown maintenance
ii) Servicing and repairing

- Q9)** a) What is the role of automobile Headlamp? Explain construction and working of Headlamp. [8]
b) Explain construction and details of an automobile seat. What are the various parts of it ? Explain with neat sketch. [8]

OR

Q10) Write short note on any Four: **[16]**

- a) Active and passive safety
- b) Ergonomics in automobile safety
- c) Adaptive Front Lighting System (AFLS)
- d) Head restraint
- e) Safety glass

Q11)a) Explain various electronically controlled systems used in today's cars. **[6]**

- b) What do you understand by sensors and actuators? Explain various sensors used in automobiles. **[6]**
- c) Explain working of electronic antilock braking system used in vehicles. **[6]**

OR

Q12) Write short note on any Three: **[18]**

- a) Basic electronic engine control
- b) Microprocessor application in automobiles
- c) Vehicle motion control system
- d) Digital cruise control



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages :4

P1716

[4859]-62

B.E. (Mech. S/W)

**OPERATIONS RESEARCH (402064B)
(2008 Course) (Semester - I) (Elective-III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to each sections should be written in separate answer sheet.*
- 3) *Neat Diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Use of non programmable calculator is allowed.*
- 6) *Assume suitable data necessary.*

SECTION - I

Q1) a) Define OR and explain its scope. [6]

b) Solve following LPP problem with simplex method. [10]

$$\text{Maximize } Z=4x_1 + 3x_2 + 6x_3$$

Subjected to

$$2x_1 + 3x_2 + 2x_3 \leq 440$$

$$4x_1 + 3x_3 \leq 470$$

$$2x_1 + 5x_2 \leq 430$$

$$x_1, x_2, x_3 \geq 0.$$

OR

a) Sketch special cases in graphical solution of LPP. [4]

b) Solve following problem by Big M method. [12]

$$\text{Minimize } Z=5x_1 + 3x_2$$

Subjected to

$$2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

P.T.O.

- Q2)** a) Explain Hungarian method of solving assignment problem. [6]
 b) Five different machines can do any of five required components with different machining time resulting from each assignment as shown in table below. Find out minimum machining time possible through optimum assignment. [10]

COMPONENT	MACHINE				
	1	2	3	4	5
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

OR

- a) Explain North West corner method of allocation for transportation problem. [4]
 b) A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. [12]

	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

Solve and optimize the solution by suitable method.

- Q3)** Write short note (any three): [18]
- ABC analysis
 - Non linear programming problems.
 - Characteristics of DPP
 - Inventory related cost
 - Sensitivity analysis in LPP
 - EOQ models

SECTION - II

- Q4)** a) Explain [6]
 i) Minimax and maximin principle.
 ii) Dominance Rule
 b) Explain steps in Decision Making. [4]
 c) Solve following Game problem with dominance rule. [6]

PLAYER ↓	PLAYER B →		
	B1	B2	B3
A1	12	-8	-2
A2	6	7	3
A3	-10	-6	2

OR

- a) The following failure rates have been observed for a certain type of transistor in digital computer. [12]

Week	1	2	3	4	5	6	7	8
Probability of failure	0.03	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed transistor is Rs.1.25. The decision is made to replace all these transistors simultaneously at fixed intervals and the individual transistors as they fail in service. If cost of group replacement is Rs.0.3 per transistor what is the best interval between group replacements. Assume Number of transistors 1000 at start.

- b) Discuss Replacement Policy for the items which fails suddenly. [4]

- Q5)** a) Find the sequence that minimizes the total required for performing the following jobs on three machines in order ABC. Processing time in minute is given below. [10]

Jobs →	I	II	III	IV	V	VI	VII
Machine A	3	8	7	4	9	8	7
Machine B	4	3	2	5	1	4	3
Machine C	6	7	5	11	5	6	12

- b) Mention any four optimality criteria for sequencing problem. [6]

OR

- a) Assume a single channel service system of a library in a school. On an average 10 students visit per hour and book issue rate is 14 students/hour.

Determine:

- i) Probability of librarian being idle. [2]
 - ii) Probability that at least 4 students in the system [3]
 - iii) Expected time that student is in queue [3]
- b) What is simulation? Describe its advantages in solving the problems. Give its limitations with suitable example. [8]

- Q6)**a) Discuss floats. [4]

- b) Information on the activities required for a project is as follows. Find critical path, TF, FF, IF. [14]

Activity	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
NT	2	7	8	3	6	10	4	6	2	5	6

OR

- a) Write difference between PERT and CPM. [6]
- b) A small project is composed of scrap activities whose time estimates are listed below. [12]

Activities		To	Tm	Tp
I	j			
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	6	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

- i) Draw network diagram
- ii) Calculate the length and variance of the critical path
- iii) What is the approximate probability that the job on critical path will be completed in 41 days?



Total No. of Questions : 12]

SEAT No. :

P1717

[4859]-63

[Total No. of Pages :3

**B.E. (Mechanical-Sandwich)
c-ROBOTICS
(2008 Course) (Semester-I) (Elective-III)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 question from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the six degrees of freedom associated with the manipulator. [5]
b) Define Repeatability, Precision and accuracy of Robot? Why repeatability is important design characteristics? [6]
c) The mechanism connecting the wrist assembly is a twisting joint which can be rotated through 8 full resolutions from the start to end position. It is desired to have control resolution of rotation of $\mp 0.35^\circ$ at the least. What is a number of bit storage capacity to achieve this resolution. [7]

OR

- Q2)** a) How does the SCARA arm geometry differ from the vertical articulated arm? [6]
b) Why is the SCARA arm more ideal for assembly applications? [6]
c) Write short note on Socio-Economic aspects of Robotization. [6]

- Q3)** a) What is the meaning of the term “end effector”? Discuss various types of grippers used in robotics. [8]
b) Which sensor can be used along with the gripper to sense whether the object is falling? Explain its working principle. [8]

OR

P.T.O.

- Q4)** a) Explain the Design considerations of gripper selection. [8]
b) Compile a list of sensors that might be used in robotic systems. For each sensor, give an application. [8]

- Q5)** a) Explain the advantages/disadvantages of using pneumatics vis a vis hydraulics as power source for drives in Robotics. [8]
b) One of the joint of a articulated robot has to traverse from an initial angle of 20° to a final angle of 84° in 4 sec. Using third degree polynomial calculate the joint angle at 1,2, and 3 second. [8]

OR

- Q6)** a) Enlist the different controllers used in systems of a robot. Write advantages & disadvantages of each in perspective of application of robot. [8]
b) What you understand by path planning for an industrial robot? Explain linear path with parabolic blend. [8]

SECTION-II

- Q7)** a) Explain the term-inverse solution. Explain geometric approach for obtaining inverse solution. [10]
b) Derive the Euler-Lagrange equation for Robot dynamic. [8]

OR

- Q8)** a) Explain D.H. parameters and derive the expression which relates two consecutive coordinate frames with the help of neat sketch. [10]
b) Explain the forward kinematics associated with planar 3R manipulator.[8]

- Q9)** a) Explain the concept of low vision and high vision associated with robot vision system. [8]
b) Explain different types of edge detection techniques in vision system.[8]

OR

Q10)a) What is image segmentation ? Explain in brief different challenges encountered in real world video for segmentation. **[8]**

b) Explain different types of power transmission devices used in robots. Write advantages and disadvantages of each. **[8]**

Q11)a) How intelligence can be incorporated in robots? **[8]**

b) Describe the structure of any robot programming language with example. **[8]**

OR

Q12)a) What is a need of simulation in Robotics. **[8]**

b) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1718

[4859]-64

[Total No. of Pages :4

B.E. (Mechanical S/W)
a-COSTING & COST CONTROL
(2008 Course) (Semester-II)(Elective-IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section-I and Q.7 or Q.8, Q.9 or Q10, Q.11 or Q.12 from section-II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

- Q1)** a) State the objectives of importance of finance accounting. [8]
b) Differentiate between financial accounting and cost accounting. [8]

OR

- Q2)** a) State the limitations of financial accounting. [8]
b) Write short note on (any two) [8]
i) Sank cost
ii) opportunity cost.
iii) Conversion cost.

- Q3)** a) Write short note on essential factors for installing a cost Accounting System. [8]
b) Explain various parameters used for classifications of costs. [8]

OR

- Q4)** a) Explain in brief about Direct & Indirect expenses. [8]
b) Explain manufacturing over heads & distribution over head. [8]

P.T.O.

Q5) a) In a factory working six days in a week & eight hours each day, a worker is paid at the rate of Rs.100 per day basic plus DA @120% of Basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to:

Job X 15hrs

Job Y 12hrs

Job Z 13hrs

The time not booked was wasted while waiting for a job. In cost Accounting how would you allocate the wages of workers for the week? **[8]**

b) State following terms in Brief **[8]**

i) Cost centre

ii) Controllable cost.

OR

Q6) a) Following Information is available for the first & Second quarter of the year 2008-2009 of ABC Ltd. **[16]**

	Production in (units)	Semi-variable cost (Rs)
QuarterI	36,000	2,80,000
QuarterII	42,000	3,10,000

You are required to segregate the semi-variable cost & calculate.

i) Variable cost per unit.

ii) Total fixed cost.

SECTION-II

Q7) a) A cock manufacturing company produces the following products by using 5000 tonnes of coal @Rs.15/- /tone into a common process [8]

coke 3,500

Tar 1,200 tonnes

Sulphate of amonia 52 tonnes

Benzol 48 tonnes

Apportion the Joint cost amongst the products on the basis of the physical unit method.

b) find out the cost of joint products A& B using contribution margin method from the following date.

Sales:

Product A: 100 kg @Rs.60 per kg

Product B: 120 kg @Rs. 30 per kg

Joint costs:

Marginal cost Rs 4,400/-

Fixed cost Rs. 3,900/- [8]

OR

Q8) a) Discuss the distinguish features of process cost system. [8]

b) What are the methods of apportioning joint costs? Explain any one in brief. [8]

Q9) a) Define the following Ratio Analyiss [8]

i) Efficiency Ratio

ii) Activity Ratio

iii) Calender Ratio

iv) Actual Capacity usage Ratio

- b) Compute the sales variances (total, price, volume) from the following figures. [8]

Product	Budgeted Quality	Budgeted Price per Unit(Rs)	Actual Quantity	Actual price Per Unit (Rs)
P	4000	25	4800	30
Q	3000	50	2800	45
R	2000	75	2,400	70
S	1000	100	800	105

OR

- Q10*a) State limitations of break even analysis. [8]

- b) Difference between adsorption costing & marginal costing. [8]

- Q11*a) State the basis of standard costing [9]

- b) State need for standard cost. [9]

OR

- Q12*a) Write a short note on (any two) [18]

- i) Techniques of marginal costing.
ii) Types of standards in standard costing.

- b) Uncontrollable costing.



Total No. of Questions : 12]

SEAT No. :

P3556

[4859]-65

[Total No. of Pages : 2

B.E. (Mechanical - SW) (Semester - II)

MACHINE TOOL DESIGN

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from sections II.*
- 2) *Answer to the two sections should be written in separate answer book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Sketch and explain nut and screw transmission mechanism (sliding friction and rolling friction) used in machine tools. [8]
- b) Explain with neat sketch Geneva mechanism used in machine tools for intermittent motion. [8]

OR

- Q2)** Calculate rpm values and diameter range served by each rpm for the following conditions. $n_1 = 30 \text{ rpm}$, $n_2 = 375 \text{ rpm}$, number of steps $z = 10$, $v = 20 \text{ m/min}$. Use geometric progression. [16]

- Q3)** A bed subjected to torsional loading is constructed as a closed box type structure, while a bed subjected to bending is constructed as I-section. Why? Give mathematical proof to support your conclusion. [16]

OR

- Q4)** A vertical milling machine is to be designed for cemented carbide face milling cutter with number of teeth = 14. The minimum cutting speed is 60 rpm and maximum is 240 rpm. Determine the frequency range that must be avoided while designing the elements of the machine. [16]

- Q5)** a) Explain the procedure to design rolling friction power screws for strength under cyclic loading. [9]
- b) Explain the procedure to design anti-friction screw-and-nut assembly for stiffness. [9]

P.T.O.

OR

- Q6)** a) List and sketch different types of guideways [9]
b) Explain with neat sketch stick-slip motion in slideways. [9]

SECTION - II

- Q7)** State and explain design procedure for spindle and spindle support using deflection and rigidity analysis. [16]

OR

- Q8)** Explain the procedure for analysis of anti-friction bearing. [16]

- Q9)** Write a short note on adaptive control system used in machine tool. [16]

OR

- Q10)** Sketch and explain components of control systems used in machine tool (any four) [16]

- Q11)** Write a short note on design consideration in micro machining. [18]

OR

- Q12)** Write a short note on recent trends in machine tool automation. [18]



Total No. of Questions : 12]

SEAT No. :

P2034

[4859]-66

[Total No. of Pages : 2

B.E. (Mechanical Sandwich) (Elective - IV)
ENERGY MANAGEMENT & INDUSTRIAL POLLUTION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the need of renewable energy sources and how do an industry, nation and globe would benefit from energy efficiency? [9]
- b) Discuss energy security and energy strategy for the future of the nation. [9]

OR

- Q2)** a) What are different types of Electric Motors? Write short note on Energy Efficient Motors. [9]
- b) Explain the concept of power factor improvement? Discuss about the location of capacitor for power factor improvement. [9]

- Q3)** a) What are the types of Energy Audit? Explain in detail methodology for conducting detailed energy audit. [8]
- b) With suitable example, explain the need for fuel substitution. [8]

OR

- Q4)** a) What do you mean by Time value of Money? Discuss the various financial analysis techniques for investments in energy efficiency projects. [8]
- b) A cogeneration system installation is expected to reduce an annual company's bill by Rs.20 Lacks. If the capital cost of the new cogeneration installation is Rs. 60 Lacks. & Rs. 5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment (%ROI). What is the future value of Rs.1000/- after 3 years if the interest rate is 10%? [8]

P.T.O.

- Q5)** a) Explain the opportunities for improving energy efficiency in the boilers and furnaces. [8]
b) Write short note on Insulating materials and refractory materials. [8]

OR

- Q6)** a) How energy conservation is possible in pumping systems? [8]
b) Write the areas for improving the thermal efficiency of the HVAC systems. [8]

SECTION - II

- Q7)** a) Write a note on Man and Environment. [9]
b) Discuss the concept of Emission Trading and clean Development Mechanism. [9]

OR

- Q8)** a) Discuss various global environmental issues and ways to control it. [10]
b) Write short note on Fossil related pollutants. [8]

- Q9)** a) What are the sources of water pollution and air pollution with reference to industrial pollution? [10]
b) Explain in short, different air quality control techniques? [6]

OR

- Q10)** a) Write short notes on : [10]
i) Marine Pollution
ii) Water pollution laws and standards
b) Write a short note on waste Water Treatment [6]

- Q11)** a) Write a note on waste minimization techniques. [8]
b) What are the direct and indirect benefits of waste heat recovery? [8]

OR

- Q12)** a) What do you understand by the sustainable development? [8]
b) Write short notes on : [8]
i) E waste
ii) Cogeneration

❧❧❧

Total No. of Questions : 12]

SEAT No. :

P1719

[4859]-67

[Total No. of Pages :3

B.E. (Electrical)

PLC AND SCADA APPLICATIONS

(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) Define Programmable Logic Controller. [5]
- b) State some important applications of PLC. [7]
- c) State the various criteria for selecting PLC for a particular application.[6]

OR

- Q2)** a) State and explain advantages and disadvantages of PLC in detail. [10]
- b) What are the components and different functions of CPU? [8]
- Q3)** a) Explain on Delay Timer and Off Delay Timer with their timing diagrams.[8]
- b) Three motors are being controlled using three separate timers. Each motor will remain ON for 10 sec. After every 10 sec previous motor stops and the next motor becomes ON . This will continue in a cycle. Switch I1 is used to start and I2 is used to stop the cycle. Following table explains the function. [8]

P.T.O.

Inputs – Switches I1,I2

Outputs – Motors Q1, Q2, Q3

I1=1 & I2=0	Timer	Time	Q1	Q2	Q3
-----	T1	10s	1	0	0
-----	T2	10s	0	1	0
-----	T3	10s	0	0	1
I1=0 & I2=1	-----	-----	0	0	0

OR

- Q4)** a) Explain programming equipment. [8]
b) Explain input analog devices. [8]

- Q5)** a) Explain the effect of varying only proportional constant (K_p) of PID controller on the output. [8]
b) State various methods of PID tuning. [8]

OR

- Q6)** a) Explain speed control of Dc motor. [8]
b) Explain speed control of DC motor with ac power source. [8]

SECTION-II

- Q7)** a) Define and explain any four components of SCADA system. [8]
b) Explain how SCADA architecture is achieved in an electrical power system. [8]

OR

- Q8)** a) State advantages and disadvantages and applications of SCADA system. [8]
b) Explain SCADA data transfer through PLC. [8]

- Q9)** a) Explain SCADA system architectures or generations in detail. [8]
b) Explain with block diagram use of SCADA in water purification system. [8]

OR

- Q10)** a) Write short note on Intelligent Electronic Devices (IED). [8]
b) Explain with block diagram use of SCADA in chemical plant. [8]

- Q11)** a) Draw and explain seven layers of OSI model and their functions. [9]
b) Draw and explain IEC 61850 layered architecture. [9]

OR

- Q12)** a) Explain Ethernet/IP protocol. [9]
b) Write note on security implications of the SCADA protocols. [9]



Total No. of Questions : 12]

SEAT No. :

P1720

[4859]-68

[Total No. of Pages :3

B.E. (Electrical Engg.)

POWER SYSTEM OPERATION & CONTROL

(2008 Course) (Semester-I) (403142)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the following terms. **[9]**
- i) Steady state stability
 - ii) Transient stability
 - iii) Dynamic stability
- b) By the use of equal area criterion, derive the equation for critical clearing angle and critical clearing time, when a generator supplies power to load & fault(3-ph) takes at generator terminals. Also calculate critical clearing angle & critical clearing time when maximum power $P_{max} = 2p4$ & steady state power $p_e = p_o = 1p4$, $H = 6M5/MVA$ & $f = 50Hz$. **[9]**

OR

- Q2)** a) Discuss the solution of swing equation by point by point method. **[9]**
- b) State and explain the methods for improvement of transient stability. **[9]**
- Q3)** a) What are the sources of reactive power? Explain the synchronous motor as a source of reactive power with neat phasor diagram & compare it with static capacitor. **[8]**
- b) Sketch the loading capability curves of synchronous generator and explain reactive power generation and absorption by the unit. **[8]**

OR

P.T.O.

Q4) a) What is series compensation? State and explain the problems associated with series compensation. [8]

b) With neat diagram, explain thyristor switched capacitor (TSC) & thyristor controlled reactor (TCR). [8]

Q5) a) What are the problems of AC transmission system? Explain the evolution of FACTS technology. [8]

b) Explain the thyristor controlled series capacitor with.

i) Neat diagram.

ii) With application. [8]

OR

Q6) a) Explain the principle of operation of STATCOM with neat diagram. [8]

b) Write short notes on [8]

i) UPFC (Unified power flow controller)

ii) Static VAR compensators.

SECTION-II

Q7) a) Write answer to any three of following questions. [10]

i) Explain the necessity of generation control.

ii) What are the effects of frequency-variation on power system?

iii) What is the concept of single area case and two area case?

iv) What is Area Control Error (ACE) in single area case and two area case?

v) What is the free governor mode operation?

b) With block diagram and frequency responses, explain the load frequency control of single area case, with the proportional plus integral control action. [8]

OR

- Q8) a)** Explain any two of following concepts with reference to automatic generation control . [6]
- i) Droop characteristic of speed governor system.
 - ii) Generator rate constraint.
 - iii) Speed governor dead band.
- b) With neat block diagram and response, explain two area load frequency control. Also explain the concept of Area Control Error(ACE). [12]

- Q9) a)** Write answer to any four of following questions [16]
- i) What is Unit commitment task in Power System?
 - ii) What is Economic Load Dispatch task in power system?
 - iii) What are the constraints to be considered while solving Unit commitment task?
 - iv) What are the constraints to be considered while solving Economic load dispatch task?
 - v) Explain the dynamic programming method to solve unit commitment.
 - vi) Explain the priority list method of unit commitment.

OR

- Q10)a)** Explain with mathematical equation, the economic load dispatch with transmission loss and including equality constraint of meeting load.[10]
- b) Explain the cost curve of thermal generator. [6]

- Q11** Compare following types of power interchange mechanisms [16]
- i) Energy banking and power pool.
 - ii) Capacity interchange and Diversity interchange.

OR

- Q12)a)** Explain under which situations, the 'Emergency power interchange mode' is used for power transaction. [8]
- b) Explain the operation of Inadvertent power exchange. [8]



Total No. of Questions : 12]

SEAT No. :

P1721

[4859]-69

[Total No. of Pages :4

B.E. Electrical

CONTROL SYSTEMS-II

(2008 Course) (Semester-I) (403145)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1) a)** Draw electrical network & derive Transfer Function of Lag-lead compensation network & show its pole zero configuration. **[8]**
- b) Design Lead compensation for the system having OLTF

$$G(s)H(s) = \frac{25}{s(0.5s + 1)(0.016s + 1)} \text{ \& PM around } 42^\circ \quad \mathbf{[10]}$$

OR

- Q2) a)** Explain steps to be taken to design lead network by Bode plot approach. **[8]**
- b) Design a suitable lag compensator for the following unity feedback system:

$G(s) = K/S(1+2S)$; such that Phase margin is 40° and steady state error for ramp input is 0.2. **[10]**

P.T.O.

Q3) a) Define and explain the terms: Eigen values, Eigen vectors, Diagonalisation and Vander Monde Matrix. [8]

b) The state equation of the system is given by: [8]

$$\dot{X}(t) = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t).$$

Determine the following:

i) STM & ii) State equation for unit step input under zero initial condition.

OR

Q4) a) Obtain the solution for homogeneous state equation & State properties of STM. [8]

b) For the given system obtain eigen values, eigen vectors, modal matrix & diagonal matrix

$$A = \begin{bmatrix} 0 & 1 & -1 \\ -6 & -11 & 6 \\ -6 & -11 & 5 \end{bmatrix} \quad [8]$$

Q5) a) Define controllability & Observability. Explain any one method to determine it. [8]

b) Determine the state controllability and observability of the following system:

$$A = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -3 & 2 \\ 0 & 0 & -8 \end{bmatrix}; \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}; \quad C = [1 \ 0 \ 1]. \quad [8]$$

OR

Q6) a) What is the need of state observer? Explain design of full order state observer. [8]

b) For a given system

$$A = \begin{bmatrix} 0 & 15 \\ 0 & 1 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}; C = [0 \ 2]$$

Determine observer gain matrix K_e such that $S_1, S_2 = -2 \pm j3$ are Eigen values of observer gain matrix. [8]

SECTION-II

Q7) a) Explain PID controller with its characteristics, applications & its effect on system performance. [8]

b) For a unity feedback system $G(s) = \frac{6.63K}{s(s+1.71)(s+100)}$, design a PID controller to meet following specifications. $M_p=25\%$, $t_s=2$ sec and $k_v=20$. [8]

OR

Q8) a) Explain Zigler-Nichol method for tuning of PID controller. [8]

b) Write short note on design specifications in time domain and frequency domain. [8]

Q9) a) Name the various peculiar features exhibited by the non-linear systems which are not found with linear systems and explain any two such features. [8]

b) Derive the Describing function for Saturation non-linearity. [8]

OR

Q10)a) Compare the advantages and disadvantages of the Describing function method and the phase plane method for the analysis of non-linear control system. [8]

b) A system with

$$G(s) = \frac{50}{s(s+1)(s+2)}$$

includes ideal relay with output equal to ∓ 1 unit. Determine the amplitude and frequency of limit cycle by Describing function method. [8]

Q11)a) Describe briefly the two methods of determining time from phase plane trajectory. [8]

b) Determine the kind of Singularity, find the characteristic equation and draw phase portrait for the following differential equation. [10]

$$x \ddot{\cdot} + 3x \dot{\cdot} + 3x = 0$$

OR

Q12)a) Explain Liapunav's second method and Liapunav's stability theorem. [6]

b) Explain whether following quadratic form of system is positive definite or not using Sylverster's criterion.

$$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3. \quad [6]$$

c) Explain terminologies used for Scalar function: [6]

Positive definite, Negative definite, Positive semi definite, Negative semi definite with one example each.



Total No. of Questions : 12]

SEAT No. :

P2004

[Total No. of Pages : 3

[4859] - 7

B.E. (Civil) (Semester - I)
Elective - I : Architecture & Town Planning
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.*
- 2) *Assume suitable data if necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Comment on, “Architectural composition and elements of design are interdependant.” [8]
- b) Elaborate the importance of water body conservation and creation by giving suitable examples. [9]

OR

- Q2)** a) How balanced development can be achieved through integrated approach of planning. [8]
- b) How urban aesthetics is achieved by soft and hard landscaping. [9]

OR

- Q3)** a) What is the need of Built Environment in development of major cities. [8]
- b) Write a detailed note on urban renewal and associated factors and approaches. [9]

OR

- Q4)** a) Why the byelaws are responsible for enriching the spaces; within a town? Give an example. [8]
- b) Why “Urban renewal” and “Quality of life” are said to be interdependant? Explain. [9]

P.T.O.

- Q5) a)** Enlist six sustainable technologies and explain any one in detail with sketch. **[8]**
b) Elaborate a case study of “Rated Building.” **[8]**

OR

- Q6) a)** Enlist any six sustainable materials, merits and demerits of all of them. **[8]**
b) Enlist different rating systems and elaborate any one of the same. **[8]**

SECTION - II

- Q7) a)** Elaborate different theories of development with appropriate sketches. (minimum three) **[9]**
b) What role a “Neighbourhood” plays in an urban area development? **[8]**

OR

- Q8) a)** Write a short note on objectives of town planning and stages involved in development. **[8]**
b) Write short notes on **[4 + 5 = 9]**
i) TP scheme and
ii) Garden city

- Q9) a)** Explain objectives and means of traffic management. **[8]**
b) Explain **[9]**
i) Regional plan
ii) City development plan
iii) Neighbourhood

- Q10) a)** Enlist the contents of MRTP Act & its need for D.P. proposal. **[9]**
b) Explain in detail functioning of MHADA. **[8]**

- Q11)a)** What is SEZ? Elaborate its importance and SWOT analysis approach. **[8]**
- b) Enlist the usage of GLS, GPS & Rs in relation with town planning & elaborate any two. **[8]**

OR

- Q12)a)** What is the effectivity of UDPFI guidelines in rational distribution and use of resources? **[8]**
- b) Why modern tools are preferred in town planning & its management? Give an example. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3625

[Total No. of Pages : 2

[4859] - 70

B.E. (Electrical)

ROBOTICS AND AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) Explain Fixed versus Flexible Automation. [9]
- b) Explain the following term : [9]
- i) Work Cell
 - ii) Tip Speed

OR

- Q2)** a) Explain least three reasons for using a robot than human being. [9]
- b) Explain the robot history and it's motivation. [9]
- Q3)** a) Explain various electrical drives used in robotic science with their selection criteria. [8]
- b) Explain different types of links and end effectors. [8]

OR

- Q4)** a) With the help of a neat diagram, explain : [8]
- i) cylindrical Robot
 - ii) articulated Robot
- b) Write short note on actuators with neat sketch. [8]

P.T.O.

- Q5)** a) The coordinates of the point 'P' on the body are given by $\{1,-3,2\}^T$. The point is rotated about x axis by 30° and then about y axis by 60° and then z axis by 90° . Find the final coordinates of the point 'P' w.r.t. the fixed frame. [8]
- b) Explain Transformational translation in detail with example. [8]

OR

- Q6)** a) The point P with co-ordinate $\{1,1.5,1\}^T$ is travel by 4 units on x axis and then by 3 units on z axis. Find the final point. Also discuss on homogeneous matrix. [8]
- b) Explain Rotational translation in detail with example. [8]

SECTION - II

- Q7)** a) Explain D-H representation and it's importance for robotic manipulator. [9]
- b) Explain concept of geometric approach in inverse kinematics. [9]

OR

- Q8)** a) Explain : [9]
- i) Geometric Method
- ii) Direct Method
- b) Draw a neat diagram of 'PUMA Robot' and discuss on its degrees of freedom. [9]

- Q9)** a) Explain Lagrangian analysis using KE and PE. [8]
- b) Explain Jacobean analysis used in robot science. [8]

OR

- Q10)**a) Explain joint Position Control for robot motion. [8]
- b) What do you mean by robot motion. [8]

- Q11)**a) Write a note on online programming and offline programming. [8]
- b) Explain how a robot can be used for underwater welding application. [8]

OR

- Q12)**a) Write a note on programming languages. [8]
- b) Explain 'Painting Robot' with details of selection criteria and methods of control. [8]



Total No. of Questions : 12]

SEAT No. :

P1722

[4859]-71

[Total No. of Pages :3

B.E. (Electrical)

POWER QUALITY

(Paper-II) (2008 Course) (Elective-I) (Semester-I)(403143)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *In Section I, attempt Q 1 or Q2, Q3 or Q4, Q5 or Q6. In section II, attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1) a)** Why grounding is required for maintaining good power quality? Explain various grounding practices as per IEEE standard. **[10]**
- b) Define term power quality state various power quality issues. **[8]**

OR

- Q2) a)** Why are we concerned more about power quality? Define power quality as per IEEE -1159 standard? **[10]**
- b) Classify and explain short duration and long duration voltage variations with necessary diagrams. **[8]**
- Q3) a)** Define and enlist various devices used for voltage regulations. Explain reactive power management concept. **[9]**
- b) Explain various causes of voltage flickers. How voltage flickers are measured? **[7]**

OR

P.T.O.

Q4) a) What is voltage flicker? Explain short term and Long term voltage flicker. [8]

b) Explain power quality issues like overvoltage, under voltage, voltage sag and voltage imbalance. [8]

Q5) a) Explain following various voltage sag characteristics. [8]

i) Magnitude

ii) Phase angle jump

iii) Point on wave initiation

iv) Point on wave recovery.

b) Explain in detail economic impact of voltage sags. [8]

OR

Q6) a) Explain CBEMA and ITIC curves commonly used as a design target for power system equipment's. [8]

b) Explain various utility side mitigation measures for voltage sag. [8]

SECTION-II

Q7) a) Explain impact of harmonics on power system equipment's. [10]

b) Explain following terms in context with harmonics

i) Distortion power factor.

ii) Total harmonic distortion .

iii) Inter-harmonics

iv) Sub-harmonics. [8]

OR

Q8) a) Explain various power quality indices used for assessment of harmonics. [8]

b) Explain harmonics parallel resonance. What are its consequences? [10]

Q9) a) Explain transients, their sources and its effects on power system operation. [8]

b) Define transient's velocity and surge impedance. Explain the effects of line termination. [8]

OR

Q10)a) Explain transient introduced by capacitor and load switching. [8]

b) Explain computer tools used for transient's analysis. [8]

Q11)a) What is reactive and proactive approach? Explain need of power quality monitoring. [8]

b) Explain the role of intelligent systems in power quality monitoring. [8]

OR

Q12)a) Explain various techniques of data collection and analysis and selection of transducers. [8]

b) What are the requirements of power quality monitor to monitor various power quality parameters? [8]



Total No. of Questions : 12]

SEAT No. :

P1723

[4859]-72

[Total No. of Pages :3

B.E. (Electrical)

ILLUMINATION ENGINEERING
(Elective-I) (2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Define : **[8]**

- i) Plane angle
- ii) Solid angle
- iii) Illumination
- iv) MHCP
- v) Glare

Also derive the relationship between plane angle and solid angle.

b) Explain production of light and physics of generation of light. **[10]**

OR

Q2) a) Elaborate quantification of light with suitable example. **[9]**

b) State and explain laws of illumination what are the different methods of controlling natural light? **[9]**

P.T.O.

Q3) a) With suitable diagram explain the construction and working of fluorescent tubelight. [8]

b) Explain the construction and working of high pressure sodium vapour lamp with diagram. [8]

OR

Q4) a) Elaborate the working of low pressure sodium vapour lamp. [8]

b) Describe LEDs with their characteristics, construction and working. [8]

Q5) a) Explain Dimming. [8]

b) What are different optical control systems. [8]

OR

Q6) a) Classify the light fittings according to the way light reaches the object. [8]

b) What is control gear? List the various accessories under control gear circuit for gaseous discharge lamps. Also give the primary functions of control gear. [8]

SECTION-II

Q7) a) Discuss the various factors that are to be considered while designing lighting. [10]

b) Write a short note on hospital lighting. [8]

OR

Q8) a) Explain zonal cavity method for general lighting design. [8]

b) Write a short note on

i) Home lighting

ii) Office lighting. [10]

- Q9)** a) With suitable diagram explain Beam Lumen method for designing of outdoor illumination scheme. [8]
- b) State and explain road lighting code in india. [8]

OR

- Q10)**a) Discuss different problems in energy efficient lighting. [8]
- b) Explain the following terms with suitable example-Payback period, life cycle costing. [8]

Q11) Write a short on

- a) Photovoltaic lighting.
- b) Cold lighting. [16]

OR

- Q12)**a) Explain Emergency lighting with neat diagram. [8]
- b) Explain Optical Fibre Cable (OFC) and give its application. [8]



Total No. of Questions : 12]

SEAT No. :

P1724

[4859]-73

[Total No. of Pages :4

B.E. (Electrical)

PROJECT MANAGEMENT

(2008 Pattern) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) a) What is the need for Project management? Explain various phases of project life cycle. **[8]**

b) State various characteristics of project management. How is project appraisal carried out? **[9]**

OR

Q2) a) Explain Project Mangement. Explain its characteristics and importance. **[8]**

b) Describe project life cycle and draw a well labelled diagram. State its phases. **[9]**

Q3) a) Project is faced with evaluation of two alternatives A and B. The company cost of capital is 10%. Use Net present value, profitability index and paybackperiod methods to arrive at a suitable decision. **[16]**

Immediate		cash in flows				
cash out flows(in Rs. lacs)		(in Rs. lacs) at the end of				
		Iyr	IIyr	IIIyr	IVyr	Vyr
Project A	40	–	20	15	15	15
Project B	45	10	15	15	17	15

OR

P.T.O.

Q4) a) What is the importance of Project selection? Explain the probable causes of project failure.. [8]

b) What costs are associated with a project and how are they estimated? How will you carry out the financial evaluation of a project? [8]

Q5) a) Explain PERT and CPM . What is the significance of critical path? Explain the concept of crashing. [8]

b) Write short notes on : [8]

i) GERT

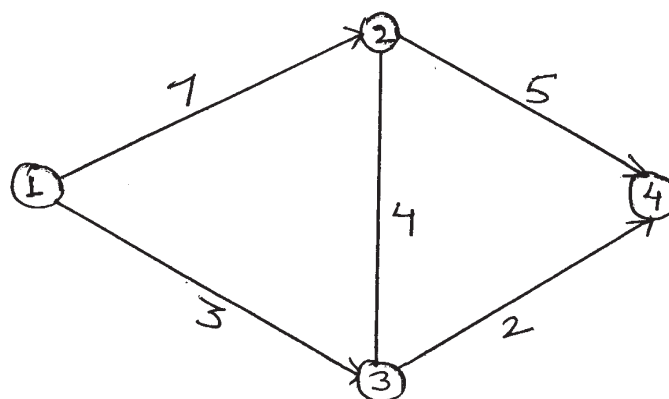
ii) Resource allocation

OR

Q6) a) The following data pertains to the network given below. It is desired to compress the project to the least possible duration day by day and estimate the extra cost. [16]

i-j	Normal Time(days)	Crash Time(days)	Cost slope (Rs. per day)
1-2	7	3	600
1-3	3	1	200
2-3	4	3	100
2-4	5	3	200
3-4	2	1	300

Network



- Q7) a)** Write short notes on: **[8]**
- i) Budgetary control
 - ii) Factors of cost escalation
- b) What are the main factors for cost escalation? How to take care of them in planning stage? **[9]**

OR

- Q8) a)** What are different cost factors? Define direct cost, indirect cost & prime cost. **[9]**
- b) What is the importance of a budget? What are the elements to be considered for making a budget? Describe the advantages of budgetary control. **[8]**

- Q9) a)** Explain short notes on: **[9]**
- i) International Project Management
 - ii) Quality of procured items
- b) Explain in detail quality planning, assurance and control. **[8]**

OR

- Q10)a)** Name the factors which are important in international project management and how to control them? **[9]**
- b) What are the different methods for maintaining the quality of procured items? Explain in detail. **[8]**

Q11)a) The expected cash inflows from a project and their probability are as under. **[9]**

Expected cash inflow (Rs)	Probability
30,000	0.30
35,000	0.40
45,000	0.10
10,000	0.15

The cash inflow acceptable for the project sponsor is Rs. 35,000. What is the certainty equivalent coefficient?

b) The expected cash inflows of a project are estimated as under. **[8]**

Year	Cash inflow(Rs)
1	2,00,000
2	3,00,000
3	4,50,000
4	3,50,000
5	2,00,000

The initial investment required for the project is Rs.7,50,000/-. The risk adjusted discount rate is 14%. Evaluate as to whether the project proposal is worthwhile.

OR

Q12)a) Write short notes on: **[8]**

- i) Portfolio risks
- ii) Diversible and Non-diversible risks.

b) Write short notes on : **[9]**

- i) Capital Asset pricing model.
- ii) Computer Aided Project Management.



Total No. of Questions : 12]

SEAT No. :

P1725

[4859]-74

[Total No. of Pages : 3

B.E. (Electrical)

a : RESTRUCTURING & DEREGULATION

(2008 Course) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 questions from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the institutional structures of Indian power sector before and after restructuring. **[8]**
- b) Explain key objectives of “Electricity Act 2003” with reference to generation, transmission and distribution sector. **[8]**

OR

- Q2)** a) Explain the working of Indian Energy Exchange for day ahead market. **[8]**
- b) Explain functions of Ministry of power and PFC. **[8]**

- Q3)** a) Explain the tariff setting principle. **[8]**
- b) Explain the following economic terms of power sector **[8]**
- i) Fixed cost and variable cost
 - ii) Capital cost
 - iii) Depreciation
 - iv) Profitability indices

OR

P.T.O.

Q4) a) Explain any two methods to assess the financial feasibility of any project. [8]

b) What do you mean by: [8]

i) Subsidy & cross subsidy

ii) O and M expenses

Q5) Explain following methods of regulations: [18]

a) Incentive regulation.

b) Rate of return regulation.

c) Benchmarking Regulation.

OR

Q6) Write short note on: [18]

a) CERC.

b) Structure of regulatory process in India.

c) Role of State Electricity regulatory Commission.

SECTION - II

Q7) Explain following models based on industry structure and contractual arrangements: [16]

a) Wholesale Competition

b) Retail Competition

c) Pool and Bilateral trade

OR

Q8) a) Compare between 'Competition for the market' and 'Competition in the market'. [8]

b) Explain in detail "The California Crisis". [8]

- Q9)** a) Explain various methods of transmission pricing. [9]
b) Explain power exchange in India. [9]

OR

Q10) Write short note the following electricity trading models: [18]

- a) integrated
- b) Wheeling
- c) Decentralised

- Q11)**a) Explain working of ISO. [8]
b) Explain the three parts of availability based tariff, how they are implemented. [8]

OR

- Q12)**a) State the key features of Indian Grid code. Also explain transmission congestion issues. [8]
b) Explain the concept of open access and transmission rights. [8]



Total No. of Questions : 11]

SEAT No. :

P3164

[Total No. of Pages : 3

[4859] - 75

B.E. (Electrical) (Semester - I)

Embedded System

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Q.No. 5 is compulsory.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, From Section - I Q.6 or Q.7, Q.8 or Q.9. Q.10 or Q.11 from Section - II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) What is an Embedded System? How would you classify embedded systems. Give examples. [8]
- b) As a system designer, what are the important considerations to be kept in mind while selecting a processor. Elaborate. [8]

OR

- Q2)** a) Define the design metrics in an embedded system. What are the different competing design matrices. [8]
- b) What is digital signal processing processor Give the architecture of any DSP processor with block diagram. [8]

- Q3)** a) Explain the various types of ADC and give their advantages. [10]
- b) How is a solenoid controlled using a relay in an embedded system? Explain the need of the clamping diode. [6]

OR

- Q4)** a) With the help of a diagram, explain the interfacing of 4 x 4 matrix keypad to a microcontroller. [8]
- b) Explain the working of a BLDC motor and show how it is interfaced with a micro-controller. [8]

P.T.O.

Q5) Write notes on any three: **[18]**

- a) RTOS.
- b) LED ripple.
- c) Interfacing a strain gauge with microcontroller.
- d) Motordrive ICs.
- e) Stepper motor.

SECTION - II

Q6) a) In the context of embedded system explain the term Task. What are the various states of a task. **[8]**

b) What is interrupt latency? ISR. Interrupt recovery time. **[6]**

c) What is device driver and explain device drivers for embedded devices. **[4]**

OR

Q7) a) Explain in detail following scheduling algorithms. **[10]**

i) First in first out.

ii) Round robin with priority.

iii) Shortest job first.

iv) Non-preemptive multitasking.

v) Preemptive multitasking.

b) Explain the concept of semaphores as an event signaling variable. **[8]**

Q8) a) What is kernel? Explain architecture of kernel. **[8]**

b) Explain how memory management is done in RTOS. **[8]**

OR

- Q9)** a) Explain the task scheduler and its function. [6]
b) What are differences between General purpose operating systems and RTOS? [6]
c) Explain the features of Vxworks. [4]

- Q10)** a) Explain case study of an embedded system for a smart card. [10]
b) What are the special features needed for embedded software in smart card? [6]

OR

- Q11)** a) Explain digital camera with functional block diagram. [10]
b) Design a control system for a prototype aircraft attitude control. [6]



Total No. of Questions : 12]

SEAT No. :

P3165

[Total No. of Pages : 3

[4859]-76

B.E. (Electrical) (Semester - I)

EXTRA HIGH VOLTAGE TRANSMISSION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any one question from unit of each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, electronic pocket calculator is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

Unit - I

- Q1)** a) Write travelling wave equations and derive solution for travelling wave equations. From the solution prove that it consists of two parts travelling in opposite directions. [10]
- b) Write note on attenuation & distortion of travelling waves. [6]

OR

- Q2)** a) A power of 2000 MW is to be transmitted from a super thermal power station over 800 km. Use 400 KV three phase line. Calculate power handling capacity of each circuit, number of circuits required, line current, loss per circuit and percentage power loss. Use 50% series capacitor compensation. Take $\sin\delta = 0.5$ Resistance and reactance per km as 0.031 ohm/km & 0.327 ohm/km respectively. [10]
- b) Write note on different types of vibrations of ehv line. [6]

Unit - II

- Q3)** a) Draw the sketch of 3 phase ehv dc line. All conductors are H meter above the ground. Considering image conductors write expression for (i) flux linkage matrix (ii) inductance matrix (iii) capacitance matrix and (iv) voltage to ground matrix. [8]

P.T.O.

- b) Derive expression for GMR of bundle conductor having “n” subconductors and bundle radius R meter. [8]

OR

- Q4)** a) Considering sequence components of currents, from flux linkage matrix of 3 phase ehv fully transposed line, derive expression for positive sequence component of inductance in terms of self and mutual inductances. [8]
- b) Write note on three modes of propagation of electromagnetic waves. [8]

Unit - III

- Q5)** a) Derive Mangolt formula for finding maximum surface voltage gradients on center phase and on outer phases for horizontal configuration of 3 phase ehv line. [10]
- b) From voltage to ground matrix of three phase ehv ac line derive expression for charge coefficient matrix and condition for maximum charge on the conductor. [8]

OR

- Q6)** a) Write expression for maximum, minimum and average voltage gradient on surface of subconductor of bundle of two subconductors. State the assumptions made. [8]
- b) A single conductor of 6.35 cm diameter of 525 KV line is strong 13 meter above ground. Calculate surface gradient for corona inception using $E_{or} = 2140m\delta \left(1 + \frac{0.0301}{\sqrt{r\delta}} \right) \frac{KV}{m} rms$. Also find corona inception voltage. Take air density factor $\delta = 1$ and surface factor $m = 0.8$. [6]
- c) A charge of 20 microcoulomb is placed at distance 2 meter from center of sphere of radius 0.5 meter. Calculate magnitude and location of point charge Q_2 which will make the sphere at zero potential. [4]

SECTION - II

Unit - IV

- Q7)** a) $V_1 V_2 V_3$ are line to ground voltages of energized circuit conductors of double circuit line. Find voltage V_4 on one conductor of unenergised circuit. [10]
- b) Write note on biological effects of electric field of power frequency. [6]

OR

- Q8)** a) Explain primary and secondary shock currents and equations for tolerable value of currents. Define threshold value and let go value of secondary shock currents. Explain also effect of frequency and magnitude of shock currents on human being. [10]
- b) Write note on insulated ground wire. [6]

Unit - V

- Q9)** a) Draw neat sketch showing location of main components of HVDC system. Explain function of each component. [8]
- b) Draw neat sketch of Graetz circuit and explain operation of converter as rectifier. [8]

OR

- Q10)** a) Explain operation of converter as inverter. Explain the terms transition value of delay angle α , ignition advance angle β and extinction advance angle r . [10]
- b) A 3 phase 275 KV 50 Hz mains feeds a 3 phase 6 pulse rectifier through 275 KV/120 KV transformer. The rectifier operates with delay 20° and overlap 12° . Calculate dc voltage of rectifier. [6]

Unit - VI

- Q11)** a) Draw the diagram showing monopolar link and diagram showing the voltage profile. Write equations for V_{dr} and V_{di} . Explain how voltage is controlled. [10]
- b) Write note on actual and ideal VI characteristics. [8]

OR

- Q12)** a) Write note on converter firing control system. Explain any one system. [10]
- b) Write note on problems associated with operation of a dc system when connected to weak ac system. [8]



Total No. of Questions : 12]

SEAT No. :

P1726

[4859]-77

[Total No. of Pages : 2

B.E. (Electrical Engineering)

SMART GRID

(403144) (Semester - I) (Elective - II) (2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable additional data, if necessary.*

SECTION - I

- Q1)** a) What is need of Smart Grid. Explain the functions of Smart Grid. [10]
b) Explain the concept of Resilient and Self healing grid. [8]

OR

- Q2)** a) Give the opportunities and barriers in Smart Grid. [8]
b) Give CDM opportunities in Smart Grid. Also explain carbon credits.[10]

- Q3)** a) What is mean by outage management? What is present status of OMS?
How it will be improved in Smart Grid? [8]
b) How Smart Grid can be benefited by implementing PHEV technology
and also give different modes of operation of PHEV. [8]

OR

- Q4)** a) Explain how automatic meter reading can make the system smarter. [8]
b) Why Real Time pricing should be implemented and give its development
stages. [8]

P.T.O.

- Q5) a)** Write a note on LED. [8]
b) Write a note on Smart Substation. [8]

OR

- Q6) a)** Explain any two Smart Storage equipments. [8]
b) Write a note on Phase Measurement Unit. [8]

SECTION - II

- Q7) a)** Explain concept of Microgrid and state its issues related to inter connection. [10]
b) Write a note on “Thin Film Solar Cells”. [8]

OR

- Q8) a)** Write a note on, Micro Turbine. [8]
b) Write a note on, captive power plant and list ratings. [10]

- Q9) a)** Write a note on Power Quality Management in Smart Grid. [8]
b) Describe the concept, Power Quality conditioners related to Smart Grid. [8]

OR

- Q10)a)** Write a note, Power Quality Audit to enhance the system. [8]
b) Explain Power Quality issues of grid connected Renewable Energy Sources. [8]

- Q11)a)** Highlight on role of GPS in Smart Grid. [8]
b) Write a note on Wi-Max based communication in Smart Grid. [8]

OR

- Q12)a)** Give the importance of Blue tooth in Smart Grid. [8]
b) Explain the cloud computing and its need. [8]



Total No. of Questions : 12]

SEAT No. :

P1727

[4859]-78

[Total No. of Pages : 4

B.E. (Electrical)
SWITCHGEAR & PROTECTION
(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the Slepian's theory of arc interruption and state its limitations. **[6]**
- b) A 50 Hz 13.8 kV, three phase alternator with grounded neutral has an inductance of 15 mH/phase and is connected to a busbar through a CB. The capacitance to earth between alternator & the CB is $0.05 \mu\text{F}/\text{phase}$. Determine: **[10]**
- i) Maximum restriking voltage.
 - ii) Average RRRV upto the first peak.
 - iii) Time for maximum RRRV.
 - iv) Maximum value of RRRV.
 - v) Frequency of oscillations.

Neglect the resistance of alternator winding.

OR

P.T.O.

- Q2) a)** Explain following terms w.r.t. circuit breaker switching: [8]
- i) Restriking voltage
 - ii) Recovery voltage
 - iii) RRRV
- b) A CB interrupts the magnetizing current of 220 kV 100 MVA, three phase power transformer. The magnetizing current of transformer is 5% of its full load current. Determine the maximum voltage that will appear at constants of CB when magnetizing current is interrupted at 56% of its peak value. Given that stray capacitance is 2500 μ F/phase & inductance is 30H/phase. [8]

- Q3) a)** Explain following ratings of CB: [8]
- i) Rated voltage
 - ii) Making capacity
 - iii) Breaking capacity
 - iv) Short time current rating
- b) With neat diagram explain construction & working of puffer type SF₆ CB. [8]

OR

- Q4) a)** With neat diagram explain construction & working of Air blast circuit breaker. [8]
- b) Write a short note on “Autoreclosing”. [8]
- Q5) a)** Explain basic requirements of protective relaying. [8]
- b) With neat diagram explain protection of parallel feeder. [6]
- c) Draw & explain trip circuit of CB. [4]

OR

Q6) a) What do you mean by zones of protection. Explain primary & back-up protection. [8]

b) Determine the time of operation of 1A, over current relay having plug setting of 125% and time multiplier of 0.6. The supplying CT is rated as 400/1 and fault current is 4000 A. The relay characteristics curve is given below: [6]

PSM	1.3	2	4	8	10	20
Time of operation (Sec)	30	10	5	3.3	3	2.2

c) With neat diagram explain operating principle of differential relay. [4]

SECTION - II

Q7) a) Draw a block diagram of static relay & explain its working. State advantages & limitations of static relay over electromagnetic relays. [10]

b) Write a short note on phasor Measurement Unit (PMU). [6]

OR

Q8) a) With neat block diagram explain working of numerical relay. State its advantages over static relay. [10]

b) Write short note on: [6]

i) Sampling theorem

ii) Anti-Aliasing filter

Q9) a) What is magnetizing inrush current in case of transformer? Explain with neat diagram the protection scheme to protect transformer against inrush current. [10]

b) The neutral point of a 10,000V alternator is earthed through a resistance of 10 ohms, the relay is set to operate when there is out of balance current of 1 Amp. The CT ratio is 1000/5. What percentage of the winding is protected against earth fault. What must be neutral to ground resistance to be connected to give 90% protection against earth fault. [6]

OR

Q10)a) With respect to alternator, explain following protection schemes: [12]

- i) Loss of Prime-mover
- ii) Loss of excitation
- iii) Unbalanced loading

b) State the advantages & limitations of Buchholz relay. [4]

Q11)a) Explain the effect of [8]

- i) arc resistance &
- ii) power swing on the operation of distance relay

b) A line section has an impedance of $(3.6 + j\sigma)$ ohms show it on R-X diagram as impedance phasor. If the relay is adjusted to operate for zero impedance short circuit at the end of the line section, show on the same R-X diagram operating characteristics of [10]

- i) Impedance relay
- ii) Reactance relay
- iii) mho relay used for the purpose

Assume that centre of mho relay characteristic lies on the line impedance phasor. If an arcing fault occurs having impedance of $(2 + j\sigma)\Omega$ anywhere on the line, determine for each type of distance relay maximum portion of the line that can be protected.

OR

Q12)a) Explain the concept of distance relaying applied to protection of transmission lines. Compare impedance relay, reactance relay & mho relay on the basis of R-X diagram, applications. [10]

b) Explain time graded and current graded system of protection of three phase feeder using overcurrent relay. [8]



Total No. of Questions : 12]

SEAT No. :

P1728

[4859]-79

[Total No. of Pages : 3

B.E. (Electrical)
INDUSTRIAL DRIVES & CONTROL
(2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) State essential parts of a drive? Explain function of each block. How drive offers flexible chara.s? [8]
- b) Explain multi quadrant operation of drive used in hoist mechanism. Explain Const. Torque & cont-power operation of drive. [8]

OR

- Q2)** a) What are the types of Mechanical loads as function of speed? Explain with speed Torque chara & suitable examples. [8]
- b) A drive has following parameters. $J = 10 \text{ kgm}^2$ $T = 15 - 0.01 N \text{ Nm}$ and load torque $T_L = 0.005N \text{ Nm}$. Where N is speed in rpm. Initially drive is in steady state. Now to reverse it, the motor chara is altered to $T = (-15 - 0.01N) \text{ Nm}$. Calculate reversal time required. [8]

- Q3)** a) What are the electrical braking Methods? Explain regenerative braking used for three phase Induction motor. Draw Torque/Speed chara. [8]
- b) A 230 V, 1000 rpm, 150 A dc separately excited Motor has arm. resi. of 0.02Ω . Motor is required to brake using plugging from 900rpm. Calculate value of ext. resistance to be added in arm. Circuit to limit braking current to twice full load value. Also calculate braking torque. [8]

OR

P.T.O.

- Q4) a)** Explain dc dynamic braking in Induction Motor. Draw torque speed chara. during motoring & braking. What precautions are required to be taken to use this method? [8]
- b) A 220V dc shunt motor has arm. resi. of 0.062Ω & with full field, of 215V, at speed of 960rpm. The motor is driving an overhauling load with torque of 172 Nm. Calculate mini speed at which Motor can hold the load by means of regenerative braking. [8]
- Q5) a)** Explain operation of a separately excited dc motor fed from a three phase fully controlled converter in armature circuit & from single phase semibridge converter in field circuit. Write possible quadrant operations. [9]
- b) Draw closed loop speed control scheme for control below and above base speed for a separately excited dc motor. Explain its operation. [9]

OR

- Q6) a)** Explain the operation of dc separately excited Motor with armature fed from single phase full controlled converter & with constant field at rated value. Explain possible quadrant operation & range of speed control of Motor. Comment on range of continuous conduction. [9]
- b) Explain closed loop control of separately excited DC motor with help of block diagram for cont torque mode of operation. [9]

SECTION - II

- Q7) a)** Draw speed torque chara. to explain static stator voltage speed control method in Induction motor drives. What is range of speed control & What are the limitations? [8]
- b) Why v/f control is preferred in Induction motor control? What are advantages & limitations? How v/f ratio is decided? [8]

OR

- Q8)** a) Explain static rotor resi. control method used for IM speed control with neat diagram & required relations. [8]
- b) What are advantages of closed loop control? Explain scheme for closed loop control used in VSI fed IM drives. [8]

- Q9)** a) What are duties of Motor? How thermal model of motor is obtained?[8]
- b) Calculate starting time of drive with parameters $J = 10 \text{ kg-m}^2$, $T_M = 15 + 0.5W_M$, $T_L = 5 + 0.6W_M$. Where W_M is angular velocity rad/sec. [8]

OR

- Q10)**a) Explain energy conservation in case of Motor Pump used for flow control using electric drive, compared with conventional throttling operation.[8]
- b) A motor operates on periodic duty consisting of loaded period of 20 min & no load period of 10 min. The Maxi temp rise is 60 °C. Heating and cooling time constants are 50 & 70 mins resp.ly. When operating continuously on no load, the temp rise is 10°C Determine: [8]
- i) Mini temp during duty cycle
- ii) Temp. when Motor is loaded continuously.

- Q11)**a) Explain flux oriented vector (FOC) control of Induction Motor using block dia. & vector dia. [9]
- b) Explain drives used in Traction for various operations. [9]

OR

Q12) Write Notes Any three:

- a) Electric drives in Textile mill. [6]
- b) Brushless DC motor. [6]
- c) Electric Drives in Paper mill. [6]
- d) Electric Drives in Sugar mill. [6]



Total No. of Questions :12]

SEAT No. :

P1680

[4859]-8

[Total No. of Pages :2

B.E (Civil)

**e:ADVANCED GEOTECHNICAL ENGINEERING
(2008 Pattern) (Elective - I) (Semester - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of logarithmic tables electronic pocket calculator tables is allowed. Is codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss 'soil identification & classification'. [8]
b) Discuss 'soil structure & clay minerals'. [8]
- Q2)** a) Explain the use of A-line chart, step by step, giving sample calculations. [8]
b) Discuss 'Diffuse double layer' & 'granular soil fabric'. [8]
- Q3)** a) Explain the steps for 'Poncelet's construction'. [9]
b) Discuss 'timbering & bracing for open cuts'. [8]
- Q4)** a) Explain the steps for 'design of gravity retaining wall' using 'Rankine's theory' by giving sample calculations. [9]
b) Explain the steps for 'Anchored sheet pile design' with suitable example. [8]
- Q5)** a) Discuss 'geosympatics & their functions'. [8]
b) Explain, slope stabilization using 'soil nailing'. [8]
- Q6)** a) Explain 'RE wall', different components & functions. [8]
b) Discuss 'Binquette & Lee' theory. [8]

P.T.O.

SECTION - II

- Q7)** Explain the following: [16]
- a) Free & forced vibrations.
 - b) Barken's method.
 - c) Pauw's analysis.
 - d) Soil structure interaction.
- Q8)** a) Discuss the design criteria for 'Impact' type machines as per IS-2974-pt-II-1966. [8]
- b) Resonance occurred at a frequency of 25 cycles/sec in a vertical block vibration test on a block of 1m x 1m x 1m. Determine C_u if the wt of oscillator is 700 N & the force produced by it at 15 cycles/sec is 1200N. [8]
- Q9)** a) Explain 'Bored compaction piles' & 'stone columns'. [9]
- b) Discuss 'Pecker grouting' & 'sand drains'. [8]
- Q10)** a) Explain the stages of inserting reinf. in 'vibro-expanded pile'. [8]
- b) Explain the steps for design of 'sand chains', for [9]
- i) $k_x = k_y$
 - ii) $k_x = 5k_y$
- Q11)** a) Discuss 'Rheology & its utility'. [8]
- b) Explain different 'Rheological models'. [8]
- Q12)** a) Differentiate between 'Basic & composite' Rheological models. [8]
- b) Explain the following: [8]
- i) Secondary consolidation
 - ii) Creep, with ref. to Rheology.

EEE

Total No. of Questions : 12]

SEAT No. :

P3166

[Total No. of Pages : 2

[4859]-80

B.E. (Electrical)

VLSI DESIGN

(2008 Pattern) (Elective - III(a)) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Differentiate between combinational circuit & sequential circuit with one example of each. **[6]**
- b) Draw state transition table, state diag. & implement the h/w circuit diagram for “1011” sequence detector using mealy model. **[10]**

OR

- Q2)** a) What do you mean by universal gate? Implement basic gates using universal gates. **[10]**
- b) Implement NAND, NOR, AND gate using 4:1 Multiplexer. **[6]**

- Q3)** a) What do you mean by Assembly language low level language & high level language VHDL is which type of language? Differentiate among all. **[8]**
- b) Define the terms & write VHDL syntax for **[10]**
- i) Entity
 - ii) Architecture
 - iii) Component
 - iv) Configuration
 - v) Subprogram

P.T.O.

OR

- Q4)** a) Write VHDL code for 1×8 Demux & draw its circuit diagram. [8]
b) Draw ckt diag. & timing diag. of MOD 6 synchronous & Asynchronous counter. [10]

- Q5)** a) Write 9 different values of std. logic. Also write the syntax in VHDL for 8×8 array of type std.logic vector. [8]
b) Explain the construction of MOSFET. [8]

OR

- Q6)** a) Explain any four data types & any four data objects used in VHDL. [8]
b) State standard device specifications of MOSFET. [8]

SECTION - II

- Q7)** a) Explain the concept of configuration with example in VHDL code. [8]
b) Draw basic gates using CMOS. [8]

OR

- Q8)** a) Write a note on MOSFET transistor. [8]
b) Define : [8]
VOH, VIH, VIL, VOL w.r.t. CMOS

- Q9)** a) Draw the architecture of PLA. Explain its each block in detail. [8]
b) Draw & explain Architecture of FPGA. [8]

OR

- Q10)** a) Write a note on simulation & synthesis. [8]
b) Define fan-in, fan-out, FOM, Noise margin w.r.t. CMOS. [8]

- Q11)** a) Write VHDL code for 4 bit Adder. [8]
b) Write VHDL code & explain 8×8 RAM. [10]

OR

- Q12)** a) Draw block diagram of 8 bit ALU & write VHDL code for it. Explain in detail. [10]
b) Write VHDL code & draw circuit diagram of 4 bit PISO shift Register. [8]



Total No. of Questions : 12]

SEAT No. :

P1729

[4859]-81

[Total No. of Pages : 4

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2008 Course) (Semester - II) (Elective - III) (403149)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain any two of following processes of ionization. **[12]**
- i) Ionization by Collision.
 - ii) Photo-ionization.
 - iii) Secondary ionization processes.
- b) In an experiment, in a certain gaseous dielectric material, the breakdown test is performed under two electrode configurations. The gap spacing between electrodes is varied and breakdown voltage value is noted in each case. Following observations are recorded. Calculate breakdown strength for each reading and based on readings, comment about strength of air under uniform field and non-uniform field. **[4]**

	Gap spacing (mm)	4.10	6.16	8.21	10.26
Sphere-sphere electrode	Breakdown Voltage (kV)	9.2	14.7	19.3	25.0
Needle plate electrode		5.0	8.4	10.8	13.3

OR

P.T.O.

Q2) Write short note on any four of following: **[16]**

- a) Townsend's Theory of breakdown of gaseous dielectric.
- b) Streamer theory of breakdown of gaseous dielectric.
- c) Time lag for breakdown phenomenon.
- d) Breakdown in Electronegative gases.
- e) Paschen's law.
- f) Occurrence of corona discharges for point plane electrode combination with positive polarity voltage.
- g) Occurrence of corona discharges for point plane electrode combination with negative polarity voltage.

Q3) Write short note on any four: **[18]**

- a) Suspended particle theory.
- b) Cavitation and bubble theory.
- c) Stressed oil volume theory.
- d) Conduction and breakdown in pure liquid.
- e) Liquid purification system.

OR

- Q4)**
- a) Explain Thermal breakdown in solid dielectric material. Explain the practical importance of knowledge of thermal breakdown voltage. **[6]**
 - b) Explain the Electro-mechanical and Electro-chemical breakdown phenomenon. **[6]**
 - c) Explain the effect of multiple layers, thickness of layers and interfaces on the breakdown in composite dielectric material. **[6]**

- Q5)** a) With schematic diagram, explain the lightning phenomenon and occurrence of overvoltage. Draw and give the specification of lightning impulse wave. [8]
- b) Explain various reasons of occurrence of switching overvoltage. What are the remedial actions to mitigate the switching overvoltage. [8]

OR

- Q6)** a) What is the practical importance of the insulation coordination? Explain the statistical approach of insulation coordination, with probability density function. Explain the relation between statistical safety factor and risk of failure. [8]
- b) Draw the diagram highlighting internal structure of Gap type arrester and Gapless type of lightning arrestors. Compare the working Gape type arrester and Gapless type of lightning arrestors. [8]

SECTION - II

- Q7)** a) Explain the working of 3-cascade connected transformers used for generation A.C. Voltages. [8]
- b) With neat diagram, explain the basic principle of Van-de Graff's generator. [8]

OR

- Q8)** a) Write notes on trigatron gap. [8]
- b) Draw a neat sketch of a standard impulse wave. Explain specifications for standard lightning wave and tolerances. [8]

- Q9)** a) Write note on sphere gap voltmeter. State and explain the different factors affecting the reading. How correction factors for atmospheric condition changes are applied. [8]
- b) With neat diagram explain CVT. Explain its advantages also. [8]

OR

Q10)a) Explain basic principle of operation of Hall Generator used for measurement of d.c. current. [8]

b) Explain principle of operation, working and construction of Generating Voltmeter used for measurement. [8]

Q11)a) Explain various tests conducted on insulator in high voltage testing laboratory. [9]

b) Explain the following short circuit tests on circuit breaker. [9]

i) Direct test

ii) Synthetic test

OR

Q12)a) Explain how radio interference voltage of high voltage apparatus is measured. [9]

b) Write a short note on Design, layout and grounding of HV laboratory. [9]



Total No. of Questions : 12]

SEAT No. :

P1730

[4859]-82

[Total No. of Pages : 4

B.E. (Electrical)

c - DIGITAL SIGNAL PROCESSING

(Semester - II) (Elective - III) (2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Distinguish between the following: **[8]**

- i) Continuous Time Signal and Discrete Time Signal.
- ii) Unit step and Unit Ramp functions.
- iii) Periodic and Aperiodic signals.
- iv) Deterministic and Random signals.

b) i) Find whether the following signals are periodic or not. **[8]**

1) $x(n) = \sin 2\pi n + \sin 6\pi n$

2) $x(n) = \cos\left(\frac{1}{4}n\right)$

- ii) Explain the properties of unit impulse function.

OR

Q2) a) Explain the process of reconstruction of a band limited Signal. **[8]**

b) Determine the output response $y(n)$ if two sequences are **[8]**

$x(n) = \{1, 2, 3, 2\}$, $h(n) = \{1, 2, 2\}$ graphically.

P.T.O.

- Q3) a)** State convolution theorem (Time & Frequency) of Fourier Transform. **[8]**
- b) Determine the Fourier transform of the following signals: **[10]**
- i) $x(t) = t \cdot \cos.t$
- ii) $x_1(t) = x(t-3)$

OR

- Q4) a)** State the methods of determining inverse Z-transform & Explain any one of them. **[8]**
- b) Solve the following differential equation using Z-transform for the specified initial conditions: **[10]**

$$y(n) - y(n-1) + \frac{1}{4} y(n-2) = x(n); n > 0$$

$$\text{where } x(n) = 2 \left(\frac{1}{8} \right)^n; y(-1) = 2 \text{ \& } y(-2) = 4$$

- Q5) a)** What do you mean by Ideal selective filters? Draw the frequency response characteristics of Ideal low pass & high pass filters. **[6]**
- b) Determine & sketch the magnitude & phase response of the following system: **[10]**

$$x(n) = 1; \text{ for } n = -2, -1, 0, 1, 2$$

$$= 0 \text{ otherwise}$$

OR

- Q6) a)** What do you mean by Linear phase systems? Define phase & group delay. **[6]**
- b) Find frequency response and plot magnitude and phase response for following system: **[10]**

$$x(n) = 1; \text{ for } n = 0, 1, 2, 3, 4$$

$$= 0; \text{ otherwise}$$

SECTION - II

- Q7)** a) Explain with suitable example any 3 properties of DFT. [8]
b) Explain 8-point Radix 2 DIT FFT algorithm. [8]

OR

- Q8)** a) Obtain 4-point DFT given that [8]

$$x(n) = \{1, 1, 0, 0\}$$

- b) Obtain circular convolution of the sequence $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{1, -2, -1, 2\}$ using tabular method. [8]

- Q9)** a) Explain characteristics of Butterworth & elliptic filters with neat diagram. [8]

- b) A low pass filter is to be designed with the following desired frequency response. [8]

$$H_d(e^{jw}) = \begin{cases} e^{-j2w} & -\pi/4 \leq w \leq \pi/4 \\ 0 & \pi/4 < |w| \leq \pi \end{cases}$$

Determine the filter coefficients $hd(n)$ if the window function is defined on

$$w(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

OR

- Q10)** a) Explain Bilinear Transformation technique with respect to IIR filter design. [8]

- b) Differentiate between: [8]

- i) Analog & Digital filter.
ii) FIR & IIR filter.

Q11)a) Obtain direct form - I realization of the difference equation. [8]

$$y(n) = b_0 x(n) + b_1 x(n-1) + b_2 x(n-2) - a_1 y(n-1) - a_2 y(n-2)$$

b) Determine parallel realization of the IIR filter represented by: [8]

$$H(z) = \frac{3(2z^2 + 6z + 4)}{(2z + 1)(z + 2)}$$

OR

Q12)a) Explain with neat diagram direct form realization of FIR filter. [8]

b) Write a short note on any one of the following: [8]

i) DSP based vibration analysis system.

ii) DSP based spectrum analysis.



Total No. of Questions : 12]

SEAT No. :

P1731

[4859]-83

[Total No. of Pages : 2

B.E. (Electrical)

**d:ANNANDITSAPPLICATIONSINELECTRICALENGINEERING
(Semester - II) (Elective - III) (2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer 3 questions from Section I and 3 questions from Section II.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) What is need of intelligent tool required to solve complex engineering problem. [9]
- b) Explain Biological inspiration and historical development of artificial neural network. [9]

OR

- Q2)** a) Explain difference between neural network and fuzzy logic. [9]
- b) Explain basic single neuron model with sketch and mathematical representation. [9]

- Q3)** a) What is hebbian learning for artificial neural network. [8]
- b) Explain Competitive learning in neural network. [8]

OR

- Q4)** a) Explain Hebbian learning with an example. [8]
- b) Explain Boltzmann learning in detail. [8]

P.T.O.

- Q5)** a) What is Perceptron architecture. Explain with neat sketch. [8]
b) What is Least-Mean square algorithm used in ANN. [8]

OR

- Q6)** a) Explain with example Perceptron training algorithm. [8]
b) Solve OR function using perceptron rule. [8]

SECTION - II

- Q7)** a) Explain momentum coefficient of Neural Network in detail. [9]
b) What is Back propagation algorithm used in ANN. [9]

OR

- Q8)** a) Explain Back-propagation algorithm using three layer network. [9]
b) Explain concept of learning rate needed in neural network. [9]

- Q9)** a) Explain kohonen network used in neural network. [8]
b) Explain in short adaptive resonance theory and it's type. [8]

OR

- Q10)**a) What is Radial Basis functions. [8]
b) Explain Hopfield Networks in neural network. [8]

Q11) Apply neural network to generation scheduling problem with example. [16]

OR

Q12) Apply neural network to solve the restoration of power supply after failure in any electrical network (consider at least 4 bus system). [16]



Total No. of Questions : 12]

SEAT No. :

P3557

[Total No. of Pages : 2

[4859] - 84

B.E. (Electrical)

MODELLING OF ELECTRICAL SYSTEM

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain the process of normalization of flex linkages and voltage equations of synchronous machines. [8]

b) With the help of electrical equations explain the basic model of synchronous machine. [10]

OR

Q2) a) Explain Park's Transformation in detail. [10]

b) Explain the electrical equations and mechanical equations of synchronous machines. [8]

Q3) a) Explain the simplified model of synchronous machine. [8]

b) Elaborate the process of determination of synchronous machine parameters from manufacturer's data. [8]

OR

Q4) a) Formulate the state space equations of synchronous machines. [8]

b) Develop the equivalent circuit of synchronous machine using subtransient, transient inductances and time constants. [8]

P.T.O.

- Q5)** a) Describe the various blocks of the complete excitation system. [8]
b) Classify and explain any three broad categories of excitation system.[8]

OR

- Q6)** a) Develop the model of complete excitation system. [8]
b) Describe in brief the various types of excitation systems. [8]

SECTION - II

- Q7)** a) Explain linear transformation and phase transformation with respect to induction motor [8]
b) Explain two axis model of induction motor. [8]

OR

- Q8)** a) Develop circuit model of induction motor [8]
b) With reference to modelling of induction motor explain the process of transformation to a reference frame. [8]

- Q9)** a) Obtain the expression for 3 ϕ induction motor voltage and current equations in [8]
i) Stator reference frame
ii) Rotor reference frame
b) Derive the expression for instantaneous torque of a 3 ϕ induction motor.[8]

OR

- Q10)**a) Obtain the expression for 3 ϕ induction motor voltage and current equations in synchronously rotating frame. [8]
b) What are the pre requisites for modelling of induction motor. [8]

Q11)Write short notes on. [18]

- a) Transformer model with nominal turns ratio
b) Three winding transformer model
c) Phase shifting transformer model

OR

Q12)Write short notes on [18]

- a) Derivation of equivalent load powers.
b) Static load modelling for load flow analysis



Total No. of Questions : 12]

SEAT No. :

P1732

[4859]-85

[Total No. of Pages : 2

B.E. (Electrical Engg.)

b - RENEWABLE ENERGY SYSTEM

(2008 Course) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable additional data if necessary.*

SECTION - I

- Q1)** a) Explain distributed generation with fossil fuels and describe any one emerging technologies for distributed generation. [8]
- b) Explain combined heat and power technology. [8]

OR

- Q2)** a) Explain with neat sketch Biomass for Electricity generation. [8]
- b) Explain proton membrane fuel cell. [8]

- Q3)** a) Draw and explain wind farm layout showing the dimensions. [10]
- b) Explain environmental impacts of wind turbines. [8]

OR

- Q4)** a) Explain how variation of Tower Height varies the different parameters in wind energy system. [10]
- b) Explain change in wind pattern and forecasting the power generation based on the wind pattern. [8]

P.T.O.

- Q5) a)** Explain the solar spectrum. [8]
b) Write a note on solar Radiation Measurements. [8]

OR

- Q6) a)** Write a note on “Altitude angle of the sun at Solar noon”. [8]
b) Explain direct and diffused radiation and effect on power generation. [8]

SECTION - II

- Q7) a)** Explain the generic photovoltaic cell and the simplest equivalent circuit for a photovoltaic cell. [8]
b) List different types of crystalline silicon technologies and explain any one. [8]

OR

- Q8) a)** How shading impacts on I-V curves. [8]
b) Explain single-crystal ozochralski silicon technology. [8]

- Q9) a)** Explain the grid - connected PV systems and its interfacing with the utility. [10]
b) Write a note on Grid Autonomy. [8]

OR

- Q10)a)** Explain different photovoltaic system types. [9]
b) Explain the Bi-directional metering and list its advantages. [9]

- Q11)a)** Explain Nucelar energy power plant. [8]
b) Write a note on Global warming and climate change. [8]

OR

- Q12)a)** Write a note on clean coal power plant. [8]
b) Write a note on ozone depletion. [8]



Total No. of Questions : 12]

SEAT No. :

P3545

[Total No. of Pages : 2

[4859] - 87

B.E. (Electrical) (Semester - II)

ELECTRICAL TRANSPORTATION SYSTEMS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) What are the Drive systems used in Indian Railways? Explain how the Traction power is controlled and delivered for these Drive Systems. [8]
b) Explain by Rail Transport is efficient and cheaper to run compared to Road Transport. [8]

OR

- Q2)** a) What are the major components for the control of electric vehicle explain with block diagram. [8]
b) What are the different types of Electric Motors used in EV? Explain any one of them. [8]

- Q3)** a) What do you understand from the specification “Automotive Battery 12 Volt, 135 AH at 20 hour rate”. [8]
b) What is continuous discharge current this battery can provide and for how many hours before getting fully discharged. [8]

OR

- Q4)** a) What are the precautions to be taken while Charging and Discharging a Lead acid Battery. [8]
b) What are the different types of lithium batteries and which battery is used electrical vehicle, also give their respective chemical reaction. [8]

P.T.O.

- Q5)** a) Give two examples of application for each of the cases of Power conversion AC to DC, DC to DC and DC to AC. [8]
b) Explain why high frequency power conversion is advantageous. [8]

OR

- Q6)** a) What is the recent trends to used ultracapacitor in electrical vehicle. [8]
b) Explain three phase fully controlled rectifier for R load. [8]

SECTION - II

- Q7)** a) Compare Advantages of Analog Controls to Digital Controls in a Electric Car instrumentation. [8]
b) What are CAN Bus controls and why this is preferred control system in present day design. [8]

OR

- Q8)** a) Write short note on brushless motor drive. [8]
b) Compare mechanical steering with electric steering. [8]

- Q9)** a) Draw with Block Diagram of a typical Drive Train of an Electric Car starting from Energy source to Drive and control at Wheels. [8]
b) What is the Power source for Electric Rail Traction. How this power is converted and controlled to provide starting Torque and high speeds.[8]

OR

- Q10)** a) Explain the various service conditions of electric drives. [8]
b) What are different classes of duties of motor? Explain with one example each. [8]

- Q11)**a) While a Lift is descending with full load how is its speed controlled and what happens to the Potential energy. [10]
b) What are the safety features in a Passenger Lift system and how to ensure that it is fail safe. [10]

OR

- Q12)**a) Explain regenerative braking used in elevator system. [10]
b) What are the safety features to be considered while designing the elevator. [10]



Total No. of Questions : 12]

SEAT No. :

P1733

[4859]-88

[Total No. of Pages : 3

B.E. (E & TC)

ELECTRONIC PRODUCT DESIGN

(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *All questions are compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Figures to the right indicates full marks.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Assume suitable additional data if necessary.*

SECTION-I

- Q1)** a) Explain reliability of product from bath tub curve. How the failures are reduced. **[8]**
- b) Explain different types of products. Compare for: **[10]**
- i) Cost.
 - ii) Reliability.
 - iii) Specifications.
 - iv) Quantity.

OR

- Q2)** a) Explain different soldering practices. State their advantages and limitations. **[8]**
- b) Write short notes on any two: **[10]**
- i) Ergonomics.
 - ii) MTTF and MTBF.
 - iii) Effect of environmental conditions on reliability of product.

P.T.O.

- Q3)** a) Explain following terms of ADC and DAC. [8]
- i) Resolution.
 - ii) Full scale output voltage.
 - iii) Accuracy.
 - iv) Linearity.
- b) Explain various factors affecting choice of op amp in signal conditioning. [8]

OR

- Q4)** a) What is the need of V_{REF} in ADCs? Explain different Performance factors to be considered while selecting ADC. [8]
- b) Explain instrumentation amplifier with neat diagram. [8]
- Q5)** a) What are different types of touch screen technologies? Explain each technology in short. Also explain how to interface touch screen with any microcontroller. [10]
- b) Explain selection factors for microcontroller in any electronic product design. [6]

OR

- Q6)** Explain following buses and protocols (Any 4): [16]
- a) SPI.
 - b) D2B.
 - c) CAN.
 - d) Flexray.
 - e) LIN.

SECTION-II

- Q7)** a) Explain waterfall model of software development. [8]
- b) Explain how to select programming language for software in a product. [8]

OR

- Q8)** a) Explain how in circuit emulator is used in software development. [8]
b) Write short note on: [8]
i) Compiler.
ii) Assembler.

- Q9)** a) Explain different termination schemes. [8]
b) What is Multilayered PCB board? Explain advantages and disadvantages of multilayered boards. [8]

OR

- Q10)**a) Explain microstrip and stripline routing. Also explain equation used to find out typical value of characteristic impedance for each geometry. [10]
b) Explain with respect to multilayer PCB. [6]
i) Use of Power and ground planes.
ii) Materials used for PCB fabrication.

- Q11)**a) Explain with reasons the selection of particular band of frequency spectrum for various communication applications. [10]
b) Explain working of any one type of PLL. [8]

OR

- Q12)**a) Write a short note on (Any 2): [10]
i) Signal to noise ratio and SINAD.
ii) Equaliz.
iii) Interleaver.
b) Draw block diagram and explain implementation of radio link. [8]



Total No. of Questions : 12]

SEAT No. :

P1734

[4859]-89

[Total No. of Pages : 3

B.E. (E & TC)

VLSI DESIGN & TECHNOLOGY
(2008 Course) (Semester-I) (404182)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Compare between common source, common drain and common gate amplifiers. [8]
- b) Explain MOSFET as current source and current sink with the help of I-V characteristics. [8]

OR

- Q2)** a) Differentiate three types of CMOS inverters with respect to gain, bandwidth and rout. [8]
- b) Draw and explain ideal and non ideal op-amp model in detail. [8]
- Q3)** a) Draw 8:1 mux using transmission gates. Compare this schematic with conventional design. [8]
- b) Explain CMOS inverter DC transfer characteristics in detail. [8]

OR

P.T.O.

- Q4)** a) Draw the schematic for a CMOS gate computing $y = \overline{(A+B+C) \cdot D}$. [4]
b) Explain: [4]
i) Body effect.
ii) Hot electron effect.
c) What is technology scaling? Explain lateral and constant field scaling. [8]

- Q5)** a) Explain the modeling styles used in VHDL with one example of each. [9]
b) Design decade counter using D flip-flop. Write VHDL code and test bench for the same. [9]

OR

- Q6)** a) Draw the state diagram and write VHDL code for detecting the sequence "111". Overlap of '1' should be considered. [9]
b) Write short note on: [9]
i) Function and procedure.
ii) Packages.
iii) Metastability.

SECTION-II

- Q7)** a) Draw the architecture of CPLD and explain. [8]
b) Explain in detail configurable logic block. [8]

OR

- Q8)** a) Compare CPLD and FPGA. [8]
b) With suitable schematic explain antifuse RAM and flash technology in detail. [8]

- Q9) a)** Explain different types of faults. Explain stuck open and stuck short in detail. [8]
- b) Explain the concept of controllability and observability with the help of an example. [8]

OR

- Q10)a)** What is the need of boundary scan? What is JTAG? List the different signals involved. [8]
- b) Explain BIST in detail. [8]

- Q11)a)** What is power optimization? Explain power distribution techniques. [9]
- b) Write short notes on: [9]
- i) Signal integrity.
 - ii) Supply and ground bounce.
 - iii) Wire parasitics.

OR

- Q12)a)** What is floor planning? What cares are taken while floorplanning? Explore switch box routing? [9]
- b) What is clock skew? Explain clock distribution techniques in detail. [9]



[4859] - 9

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS**(2008 Pattern) (Semester - I) (Elective - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocketcalculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I**Q1)** Write a note on :**[16]**

- a) Gauss Jordan & Gauss Seidel iteration method.
- b) Computer Algorithm & Programming aspects.

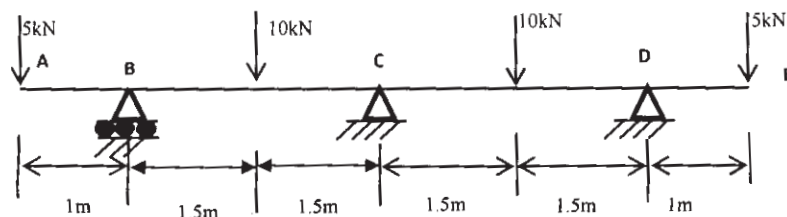
OR

Q2) a) Write a note on "Importance of Matrix Algebra in Matrix Methods of Structural analysis". **[6]**b) Solve the following equations by Gauss Elimination Method **[10]**

$$5x_1 - 2x_2 + 4x_3 = 5$$

$$-2x_1 + x_2 + x_3 = 1$$

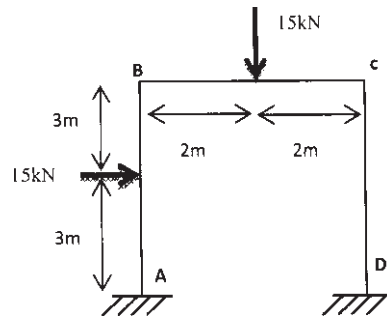
$$4x_1 + x_2 = 6$$

Q3) Analyze the beam shown below by flexibility method (EI is constant). **[18]**

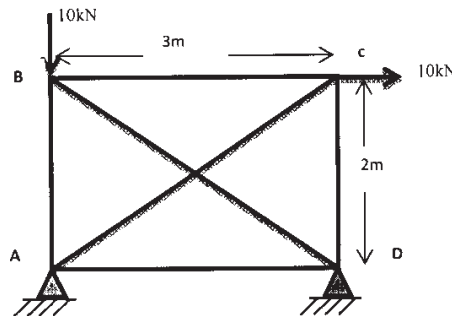
OR

P.T.O.

Q4) Analyze the portal frame using Flexibility Method (EI Constant). [18]



Q5) Analyze the truss by Flexibility Method (EI Constant). [16]



OR

Q6) Analyze the beam shown in Ex. 3 by Stiffness Method (EI is Constant).[16]

SECTION - II

Q7) Write a note on : [16]

- a) Displacement Method of structural analysis.
- b) Determinacy and Indeterminacy.

OR

Q8) a) Differentiate between structure approach and member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. [8]

b) Using first principles, establish relationship between local and global stiffness matrix of portal frame member. State clearly transformation matrix. [8]

Q9) a) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [9]

b) Explain properties and special characteristics of stiffness matrix of a structure. [9]

OR

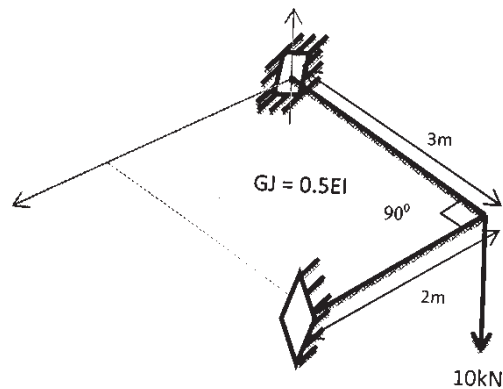
Q10) Stating clearly DOFs/node, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [18]

Q11) A single bay three storied frame is to be analyzed by computer programme of stiffness matrix method [16]

- Prepare the flow chart for the programme and state input required for the same.
- How will you input support conditions of the structure.

OR

Q12) Analyze and draw BMD for grid structure as shown below by stiffness method. [16]



Total No. of Questions : 12]

SEAT No. :

P1735

[4859]-90

[Total No. of Pages : 3

B.E. (Electronics & Telecommunication)

COMPUTER NETWORK

(2008 Course) (Semester-I) (404183)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Draw ISO-OSI model and explain in brief function of each layer. [8]
b) Compare Coaxial Cable, Twisted pair cable and Fiber optic cables. [6]
c) Compare circuit switching and packet switching network. [4]

OR

- Q2)** a) Draw and explain typical cable TV system. How cable video signal and internet data can be send over the same cable. [8]
b) What is DSL? Explain any two types of DSL. [6]
c) Explain in brief physical address, network address and port number.[4]

- Q3)** a) Explain Go Back - N ARQ and selective repeat ARQ protocols. [6]
b) Draw HDLC frame format. Write function of each field. [6]
c) How does token ring LAN operate? [4]

OR

- Q4)** a) Explain the following: [6]
i) I-persistent CSMA.

P.T.O.

- ii) Non-persistent CSMA.
 - iii) P-persistent CSMA.
 - b) What is framing concept in Data Link Layer? Explain in details. [6]
 - c) Compare the data rates for standard Ethernet, Fast Ethernet, Gigabit Ethernet and Ten-Gigabit Ethernet. [4]
- Q5)**
- a) What is IEEE 802.11? Explain wireless LAN in brief. [6]
 - b) What is the difference between: [6]
 - i) A forwarding port and a blocking port.
 - ii) Bus backbone and a star backbone.
 - c) Write a short note on Virtual LANs. [4]

OR

- Q6)**
- a) Write short notes on: [8]
 - i) Gateway
 - ii) Hub
 - iii) NIC
 - iv) Routers
 - b) Match the layers in Bluetooth and the Internet model. Explain. [4]
 - c) Distinguish between ATM and Frame Relay. [4]

SECTION-II

- Q7)**
- a) What are the services provided by the network layer to the transport layer? [6]
 - b) Briefly define subnetting. How do the subnet mask differ from a default mask in classful addressing? [6]
 - c) What is DHCP? How does it work? [4]

OR

- Q8)** a) Draw and explain the IP header in detail. [6]
b) What are different static routing algorithms? Explain any one in detail. [6]
c) Why is ARP request broadcast but ARP reply unicast? [4]

- Q9)** a) Explain the different Quality of Service parameters. Also write about transport layer service primitives. [6]
b) Explain connection establishment and connection releasing with respect to transport layer. [6]
c) What are the duties of transport layer? List the services provided by transport layer to upper layers. [4]

OR

- Q10)** a) With the help of TCP header explain the function of each field. [6]
b) How congestion affects network performance. Also explain the difference between flow control and congestion control. [6]
c) What is socket address? Explain. [4]

- Q11)** a) Explain Telnet and FTP in detail with respect to server and client communication. [8]
b) What is DNS? Explain the components of DNS system. [6]
c) What is URL and what are its component. [4]

OR

- Q12)** a) Distinguish between public key and private key algorithm. State the advantages of RSA algorithm. [8]
b) What are the main responsibilities of Application layer? Explain in brief. [6]
c) What is the function of SMTP and POP-3 protocols in E-mail system? [4]



Total No. of Questions : 12]

SEAT No. :

P1736

[4859]-91

[Total No. of Pages : 4

B.E. (E & TC)

**a-DIGITAL IMAGE PROCESSING
(2008 Course) (Elective-I) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain briefly: [8]

- i) Mach band effect.
- ii) Simultaneous contrast.
- iii) Contranst sensitivity.

b) Given below is 5×5 image. Find out distance between p and q by methods: [8]

- i) Eucledian Distance.
- ii) Chess Board Distance.

p	5	6	4	3	2
	1	9	5	4	2
	3	4	5	6	7
	2	2	2	2	2
	2	3	2	3	2
					q

OR

P.T.O.

- Q2) a)** With a neat block schematic explain fundamental components used in basic image processing system. [8]
- b) With respect to relation between pixels explain: [8]
- 4 connectivity.
 - 8 connectivity.
 - Mixed connectivity.

- Q3) a)** What is a colour model? Compare RGB and HSI colour models with their applications. [8]
- b) Apply 3×3 Mean filter and 3×3 Median filter on Image 1. Comment on the results. (consider marked region). [10]

Image 1

12	12	13	14	15
15	16	17	15	12
11	12	95	12	11
15	16	11	10	10
10	11	12	14	12

OR

- Q4) a)** Explain the following image enhancement methods: [10]
- Pseudo colouring.
 - Contrast stretching.
- b) Explain how image sharpening can be achieved using frequency domain filtering. [8]

- Q5) a)** Explain concept of Basis images with respect to Hadamard Transform. [8]

- b) Compute DCT of the following image $\begin{bmatrix} 18 & 12 \\ 10 & 1 \end{bmatrix}$ [8]

OR
2

- Q6)** a) With reference to a 2-dimensional transform, explain: [8]
- i) Symmetry.
 - ii) Separability.
 - iii) Convolution.
 - iv) Energy Compaction.
- b) Compute DFT of the following image.

$$\begin{bmatrix} 10 & 12 \\ 18 & 1 \end{bmatrix} \quad [8]$$

SECTION-II

- Q7)** a) A simple 4×4 image is represented by following matrix-X. [9]

$$X = \begin{bmatrix} 100 & 50 & 40 & 30 \\ 20 & 15 & 35 & 50 \\ 40 & 30 & 100 & 15 \\ 20 & 40 & 30 & 20 \end{bmatrix}$$

- i) Determine the entropy of image.
 - ii) Coding-redundancy in image.
 - iii) Generate Huffman code-book.
- b) Compare lossy & lossless compression. Explain any one method used in these compressions. [9]

OR

- Q8)** a) Explain in brief lossless predictance coding with the help of encoder & decoder. [9]
- b) Explain in detail the block diagram of JPEG encoder, also explain significance of zig-zag scanning. [9]

- Q9) a)** Explain local & global thresholding in segmentation. [8]
- b) Explain Gradient & Laplacian operators for edge detector? Derive the mask for Laplacian edge detector? [8]

OR

- Q10)a)** What is Hough transform? How it is used for edge linking in an image? [8]
- b) Write short note on chain code. [8]

- Q11)a)** How image restoration is different than image enhancement? Explain the various methods for restoration of an image. [8]
- b) Explain the algorithm of character recognition of image processing. [8]

OR

- Q12)a)** Explain any one of following image processing application with specific algorithm. [8]
- i) Face recognition.
- ii) Remote sensing.
- b) Explain winner filter for image restoration. [8]



Total No. of Questions : 12]

SEAT No. :

P1737

[4859]-92

[Total No. of Pages : 3

B.E. (E & TC)

EMBEDDED SYSTEM AND RTOS

(2008 Course) (Semester-I) (Elective-I) (404184)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is a “market window” and why is it so important for products to reach the market early in this window. **[10]**
- b) The design of a particular product has NRE cost of Rs. 1,00,000/-. How much will be have to add the cost of each product if we sell **[8]**
- i) 100 units and
 - ii) 200 units. Cost of a unit product is Rs. 20/-.

OR

- Q2)** a) What are the applications of Android OS. **[6]**
- b) Compare IEEE 802.11 with IEEE 802.16. **[6]**
- c) Compare currently available processors from various manufacturers for embedded applications. **[6]**
- Q3)** a) Draw the interfacing between LPC 2148 and LCD. Write down the code in C language for displaying the word “PUNE” on LCD. **[8]**
- b) Explain Thumb - ARM differences. **[8]**

OR

P.T.O.

- Q4)** a) Explain the various types of load-store instructions in ARM. [8]
b) What are the limitations of 8 bit processor and how are they overcome in 32 bit processor. [8]

- Q5)** a) Explain the selection criteria for the selection of scheduling algorithm. [8]
b) Explain the following term related with IPC techniques. [8]
i) Unnamed pipes and named pipes.
ii) Difference between mailbox and message queue.

OR

- Q6)** a) Explain different techniques to detect and prevent deadlock conditions. [8]
b) Explain the following “preemptive” type task scheduling techniques. [8]
i) SJF | SRT scheduling.
ii) Round Robin Scheduling.

SECTION-II

- Q7)** a) State and explain the various development tools required for LINUX applications. [8]
b) Why linux as embedded OS? Explain the steps in linux kernel configuration. [10]

OR

- Q8)** a) Explain steps in the tool chain building. [8]
b) Explain the following term related with the embedded linux: [10]
i) Busy Box configuration.
ii) Busy Box operation.

- Q9)** a) Compare Android and symbian operating system. [4]
b) Explain various functional requirements for selecting an commercial RTOS. [6]
c) Compare spiral with V model. [6]

OR

- Q10)**a) Explain different stages of the embedded development process in waterfall model. [8]
b) Differentiate between QNX and VX works. [8]
- Q11)**a) State Hardware requirement of digital camera. Suggest suitable processor, memories and I/O's for it. [8]
b) Explain tasks, its priorities and IPC used in smart card. [8]

OR

- Q12)**a) Explain the semaphore, mailboxes software requirements for mobile phones. [8]
b) Explain the task scheduling model of adaptive cruise control system. [8]



Total No. of Questions : 12]

SEAT No. :

P1738

[4859]-93

[Total No. of Pages : 3

B.E. (E & TC)

c-INDUSTRIAL DRIVES AND CONTROL

(2008 Course) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables and non programmable electronics pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) With the help of circuit diagram, waveform & mathematical expressions, explain the effect of source impedance on the performance of single phase full converter. **[10]**
- b) What is DC to DC converter? Explain buck converter with circuit diagram and waveforms. **[8]**

OR

- Q2)** a) What are dual converters? Explain with circuit diagram & waveform working of 1 phase dual converter with suitable load. **[10]**
- b) With the help of a neat diagram and necessary waveforms explain the operation of four quadrant chopper. Mention its applications. **[8]**
- Q3)** a) State various harmonic reduction techniques used in inverters. Explain any one efficient technique in detail. **[8]**
- b) With the help of neat circuit diagram & waveforms, explain the operation of transistorized three phase bridge inverter with star connected balanced resistive load for 180 conduction mode. **[8]**

OR

P.T.O.

Q4) a) Compare switch mode & resonant inverters. Mention types of resonant inverters. [6]

b) Explain why three phase to single phase cycloconverter requires positive & negative group of phase controlled converters. Under what condition, the group work as inverter & rectifier? How the firing angles of the two converters should be controlled? [10]

Q5) a) Compare dynamic & regenerative braking for DC machines. Can regenerative braking be used in all cases? Justify your answer. [8]

b) With the help of a neat circuit diagram, waveforms and mathematical analysis, explain the operation of 1ϕ full converter DC drive for a separately excited DC motor. [8]

OR

Q6) a) With the help of neat diagram explain the under & over voltage protection circuit for a DC motor drive. [6]

b) What are DC motor performance parameters? Explain in brief. [6]

c) Write a short note on soft start in DC motors. [4]

SECTION-II

Q7) a) What is slip power recovery in induction motor? Explain with circuit diagram working of static Kramer system. Comment on torque speed characteristics. [10]

b) Explain with the help of neat block diagram the operation of phase failure protection circuit for AC motor drives. [8]

OR

Q8) a) What is the need of AC drives? Explain with block diagram speed control of three phase induction motor by using V/f technique. [10]

b) With the help of an equivalent circuit explain the various performance characteristics of induction motor. [8]

- Q9) a)** Write a short note on load-commutated inverter (LCI) control of synchronous motor. [8]
- b) Explain operation of permanent magnet stepper motor drive. Enlist the drive requirements of stepper motor. [8]

OR

- Q10)a)** Discuss the brushless DC & AC motor drives. [8]
- b) Explain the operation of switched reluctance motor. Why it is preferred as adjustable speed drive? [8]

- Q11)a)** Discuss traction motor AC drive in detail. [6]
- b) What is power quality? State the sources of various types of power line disturbances. What measures are to be taken to prevent or nullify these disturbances? [10]

OR

- Q12)a)** Write a short note on energy audit. [6]
- b) Explain the operation of fuzzy logic-based induction motor speed control system. [10]



Total No. of Questions : 12]

SEAT No. :

P1739

[4859]-94

[Total No. of Pages : 4

B.E. (E & TC)

d-MICROWAVE COMMUNICATION AND RADAR

(2008 Course) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What do you understand by waveguide modes? What are dominant modes? **[8]**
- b) An air filled rectangular waveguide has dimensions of $6\text{cm} \times 4\text{cm}$. If propagates a signal at 3GHz. Compute the following for TE₁₀ mode. **[8]**
- i) Cut off frequency.
 - ii) Guide Wavelength.
 - iii) Phase constant.
 - iv) Phase velocity.
 - v) Group velocity.
 - vi) Wave impedance.

OR

- Q2)** a) Compare rectangular waveguides with circular waveguides. **[6]**
- b) Draw different field patterns for TE_{mn} mode. Explain the need of coupling probes and loops. **[6]**
- c) Explain the different power losses that takes place in rectangular waveguide. **[4]**

P.T.O.

- Q3)** a) Explain the properties of H-plane Tee using s-matrix. [6]
- b) Explain directional coupler. Define: [6]
- i) Coupling coefficient.
 - ii) Directivity.
 - iii) Isolation loss.
- c) Explain the functioning of Flap and vane attenuator. [6]

OR

- Q4)** a) Write a note on: [6]
- i) Microwave filters.
 - ii) Wave guide transitions.
- b) The collinear ports 1 and 2 of magic tee are terminated by impedances of reflection coefficients $\Gamma_1 = 0.5$ and $\Gamma_2 = 0.6$. The difference port 4 is terminated by an impedance with reflection coefficient of 0.8. If 1 watt power is fed at sum port 3. Calculate the power reflected at port 3 and power divisions at the other ports. [6]
- c) With the help of a neat diagram explain how magic Tee used to measure the impedance. [6]

- Q5)** a) Compare two cavity klystron and reflex klystron with relevant sketches. [8]
- b) A reflex klystron operates at the peak mode $n = 2$ with $V_0 = 280$ V, $I_0 = 22$ mA and signal voltage $V_1 = 30$ V Determine: [8]
- i) Input power.
 - ii) Output power.
 - iii) Efficiency.

OR

- Q6)** a) Explain the working of cavity Magnetron. [8]
- b) Draw the construction of TWT and explain it's operation. [8]

SECTION-II

- Q7) a)** Write short notes on the following microwave devices including applications. [8]
- i) PIN diode.
 - ii) Microwave transistors.
- b) Explain the working principle of tunnel diode in detail. [8]

OR

- Q8) a)** Explain the various modes of operation of Gunn diode. [8]
- b) Write note on: [8]
- i) Parametric amplifiers.
 - ii) Schottky barrier diodes.

- Q9) a)** Explain how VSWR, impedance and frequency can be measured using a slotted waveguide. [8]
- b) A slotted line is used to measure the frequency and it was found that the distance between the nulls is 1.85 cm. Given guide dimensions are (3 × 1.5) cm. Calculate the value of frequency. [6]
- c) Write note on measurement of noise factor. [4]

OR

- Q10) a)** Explain Robert's and Von-Hippel method of dielectric constant measurement. [6]
- b) Explain Calorimetric method for measurement of microwave power. [6]
- c) Explain in brief network analyser. [6]

- Q11)**a) How do you distinguish stationary targets and moving targets. Explain the principle and working of an MTI Radar. [8]
- b) Explain the Planar Array Radar. [4]
- c) Explain the advantages and limitations of A scope radar display. [4]

OR

- Q12)**a) Derive the RADAR range equation and explain the factors affecting the RADAR range. [6]
- b) A guided missile tracking radar has the following specifications. [6]
- i) Transmitted pulse = 400 kW.
 - ii) Pulse Repetition frequency = 1500 pps.
 - iii) Pulse width = 0.8 μ sec.
- Determine unambiguous range, duty cycle, average power, suitable bandwidth for radar.
- c) Write a short note on radar beacons. [4]



Total No. of Questions : 12]

SEAT No. :

P1740

[4859]-95

[Total No. of Pages : 3

**B.E. (Electronics & Telecommunications)
a-ENTREPRENEURSHIP DEVELOPMENT
(2008 Course) (Elective-II) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Answer three questions from each section.*

SECTION-I

Q1) a) Discuss the importance of Entrepreneurship to Engineers in today's highly competitive corporate world. [7]

b) Explain how the state of economy of nation affects growth of Entrepreneurs & Entrepreneurship. [9]

OR

Q2) a) Explain how it is possible for corporates to promote entrepreneurship among the employees within the organization. [7]

b) State and explain the parameters to be considered by entrepreneur while launching a new product or service. [9]

Q3) a) Differentiate between Private & Public limited ownership models. [7]

b) What is demand economy; how it affects the businesses, explain the strategies an entrepreneur need to formulate in order to tackle compelling issues with demand economy. [9]

OR

Q4) a) Differentiate between cost and price of product, state and explain factors which influence pricing of a product? [8]

b) State legal forms of business; explain which legal form is more convenient to entrepreneurs to raise finances at minimum expense. [8]

P.T.O.

- Q5)** a) What is business plan? Explain how the business plan helps entrepreneurs while starting a new enterprise. [8]
- b) Explain role of marketing in business. Explain the techniques used for marketing in today's highly competitive world. [6]
- c) Explain the measures used to minimize the various risks involved in a manufacturing business. [4]

OR

- Q6)** a) Explain the methodology you will practice as an entrepreneur while taking finance from a bank. [7]
- b) How will you take care of direct and indirect of competition in your business? [5]
- c) Comment on selection of proper location in a retail business. [6]

SECTION-II

- Q7)** a) Explain how a business gets affected if the selection of employees is not done in a proper way. Discuss the ways to hire the staff. [8]
- b) State and explain types of records used in record keeping system used in a business. [8]

OR

- Q8)** a) Discuss various components of compensation packages used to attract employees. [5]
- b) State and explain the methods used to track Inventory. [7]
- c) Comment on importance of employee evaluation. [4]

- Q9)** a) What is financial Management? Explain how businesses get affected due to mismanagement of finance. [8]
- b) Explain how effective use of technology can help the business to improve operational efficiency. [8]

OR

Q10)a) State types of professionals an entrepreneur needs to hire for running a successful business. Explain the role of them in brief. [7]

b) Explain in brief methods used to analyze financial performance of a business. [9]

Q11)a) State and explain in detail the legal requirements to be complied with while starting a new enterprise. [9]

b) State & explain the importance of consumer protection laws to an entrepreneur. [9]

OR

Q12)a) List and explain ethical issues one needs to consider in managing business. [8]

b) What is Product life cycle and development? Explain various stages involved in development of a new product. [10]



B.E. (Electronics & Telecommunication)
b-JOINT TIME FREQUENCY ANALYSIS
(2008 Pattern) (Semester-I) (Elective-II) (404185)

Time : 3 Hours]

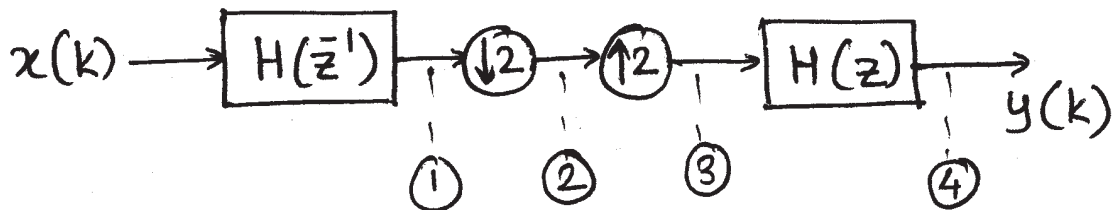
[Max. Marks : 100

Instructions to the candidates:

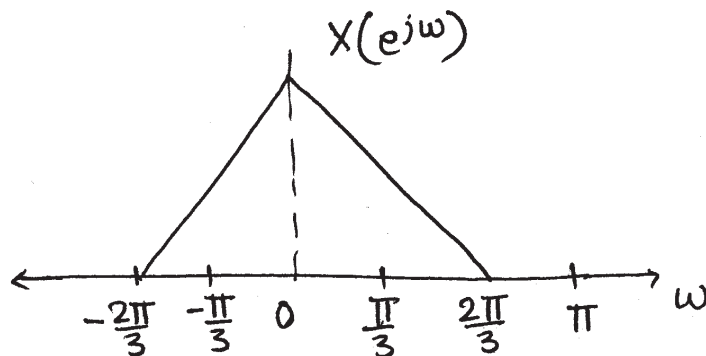
- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Answer three questions from each section.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Consider the following system: **[12]**



Give the z-transform and Fourier Transform of the signal at locations (1) to (4). Make the corresponding graphs of the Fourier Transform assuming that H(Z) is an ideal half-band LPF & X(Z) has the following spectrum.



b) Discuss the Parseval's Theorem. **[4]**

OR

P.T.O.

Q2) a) Discuss the difference between STFT & Wavelet Transform alongwith their mathematical formulae. [8]

b) Calculate the minimum limit on the Time-Bandwidth product and mention the optimum function which satisfies it. [8]

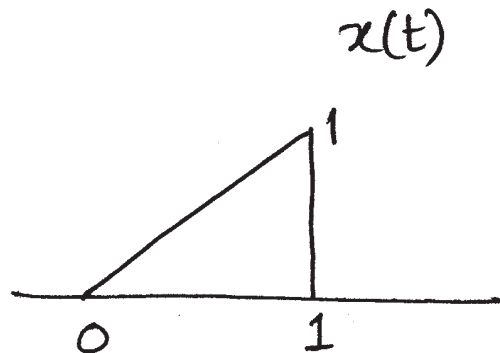
Q3) a) Obtain & sketch the magnitude & frequency response of synthesis filters of Haar 2-band filterbank. [12]

b) State the conditions for an analysing function $\psi(t)$ to be called as 'Wavelet'. [6]

OR

Q4) If $x[n] = \{5, 8, 7, 3\}$. Decompose $x[n]$ till V_0 using Haar Wavelet Packets. Show perfect reconstruction. Sketch the basis functions used in reconstruction stage. $x[n] \in V_3$. [18]

Q5) a) Find the projections of a given signal $x(t)$ on the spaces V_0, V_1 & V_2 using approximations. Use Haar Scaling function as kernel for deriving the projections. [8]



b) Discuss the MRA Axioms. [8]

OR

Q6) Write short note on: [16]

a) Hilbert Transforms & it's applications.

b) Time Frequency Tiling of STFT & CWT.

SECTION-II

Q7) Decompose the signal

$x[n] = \{ 3, 2, 3, 1, 4, 5, 6, 4 \}$ using lifting scheme, till V_0^{th} subspace. Signal belongs to V_3 subspace. **[18]**

- a) Show the in-place computation.
- b) Verify the reconstruction with block schematic of lifting scheme.

OR

Q8) Discuss the concept of orthogonality and bi-orthogonality with examples. Calculate the analysis filter coefficients for Biorthogonal 5/3 tap design in JPEG-2000. **[18]**

- Q9)** a) Discuss scalograms & spectrographs. **[8]**
- b) What are the wavelet packets? Discuss with block schematic and state the advantages / disadvantages. **[8]**

OR

Q10) Given $x[n] = \{15, 8, 21, 8, 30, 2, 8, 0\} \in V_3$. Show the smoothing effect. Reconstruct after suppressing coefficients in W_j subspace. **[16]**

Q11) Explain the effect of dilation and translation of a function $\phi(t)$ and $\psi(t)$ in frequency domain. **[16]**

OR

Q12) Write short note on: **[16]**

- a) Analytic wavelets.
- b) Applications of wavelet transforms.



Total No. of Questions : 12]

SEAT No. :

P1742

[4859]-97

[Total No. of Pages : 3

**B.E. (Electronics & Telecommunication)
c-MICROELECTROMECHANICAL SYSTEM &
SYSTEMS ON CHIP (MEMS & SOC)
(2008 Course) (Semester-I) (Elective-II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three from each section.*
- 2) *Answer to the two sections should be written on separate answer books.*
- 3) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section-II.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the difference between MEMS and Microsystems. [8]
b) Write general desirable general characteristics of MEMS. [8]

OR

- Q2)** a) What are the essential components of Microsystems? Explain them in short. [8]
b) Enlist application of MEMS and Microsystems in Biomedical Industry. [8]

- Q3)** a) What are different materials which are used in MEMS? [8]
b) Justify “Silicon-an ideal substrate material for MEMS” [8]

OR

- Q4)** a) What is “Conductive Polymers”? Write methods how polymers can be made conductive. [8]
b) Differentiate GaAs and Silicon with respective micromachining characteristics. [8]

P.T.O.

- Q5)** a) What are the major technical issues in BioMEMS Products? [8]
b) Write short note on: [10]
i) Magnetic Actuators.
ii) Portable blood analyzer.

OR

- Q6)** Write short note on (Any Three): [18]
a) Chemical Sensors.
b) BioMEMS Glucose Sensors.
c) Microaccelerometers.
d) Magnetic sensor.

SECTION-II

- Q7)** a) Explain important characteristics of VLSI technology that are leading to overall organization of microprocessors. [9]
b) Explain SoC design flow. [8]

OR

- Q8)** a) Highlight important parameters which define wafer level bonding? Describe its significance. [9]
b) How chip complexities make impact into design? [8]

- Q9)** a) Explain merits and demerits of behavioural synthesis. [9]
b) Explain 'Path search methods' routing technique for IC design. [8]

OR

- Q10)** a) Explain in detail abstraction levels associated with synthesis tools? [9]
b) Compare dry and wet etching? [8]

Q11)a) Write brief note on “Taxonomy of Co-Design”. [8]

b) What are the Co-design Tools for SoC? Explain it in short. [8]

OR

Q12)Write short note on (Any Three): [16]

a) Core-based Integrated Circuits.

b) Built in self test.

c) Hardware / Software Co-design Testing of Micro system.

d) Factors lead to failure in packaging.



Total No. of Questions : 12]

SEAT No. :

P1743

[4859]-98

[Total No. of Pages : 3

B. E. (E &Tc)

d-MOBILE COMMUNICATION

(2008 Pattern) (Semester-I) (Elective-II)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Answer any 3 questions from each Section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain with neat diagram the technique used to select and allocate channel groups for all cellular base station within a system. **[8]**
- b) In detail compare GSM and IS-95 with following parameter : **[8]**
- i) Uplink and downlink frequency
 - ii) Carrier suppression
 - iii) Channel Data rate
 - iv) Voice channel per carrier

OR

- Q2)** a) A 2 MHz of total spectrum is allocated for duplex wireless system and each simplex channel 25 KHz RF band width. Find
- i) No. of duplex channel,
 - ii) Total No. of channel per site if $N=4$ and 7 cell reuse is used. **[8]**
- b) Describe the working of three techniques used to improve coverage and capacity in cellular system. **[8]**

P.T.O.

- Q3)** a) Explain the free space propagation model to derive an expression for path Loss in GSM system. [8]
- b) Explain in brief with neat diagram the reflection propagation mechanism in mobile communication system. [8]

OR

- Q4)** a) Explain different physical factors in radio propagation channel that influence small scale fading. [8]
- b) With neat diagram, explain the working of direct RF pulse system used to measure small scale multipath structure. [8]
- Q5)** a) List the factors influencing the choice of digital modulation . What is the theoretical maximum data rate that can be supported in 200 KHz channel for SNR= 10 dB & 30 dB. [10]
- b) Explain with neat diagram the working of BPSK receiver with carrier recovery circuit . [8]

OR

- Q6)** a) Explain with neat diagram the technique to compensate Inter symbol Interference created by multipath within the time dispersive channel. [10]
- b) With neat diagram , explain the diversity technique to compensate fading channel. [8]

SECTION-II

- Q7)** a) Explain in brief the following characteristics of speech signal : [8]
- Probability density function.
 - Autocorrelation function.
 - Power spectral density function
- b) Draw a neat diagram to explain the detail working of LPC coding system. [8]

OR

- Q8)** a) Compare TDMA and CDMA multiple access techniques. [8]
- b) Differentiate between Channel capacity and Radio capacity of cellular system. Explain in brief the packet radio access technique. [8]

- Q9)** a) Classify and explain in brief the significance of different logical channels for GSM. [8]
- b) Explain with neat diagram in detail the working of GSM architecture. [8]

OR

- Q10)**a) Describe in brief the working of different Hard Handoff's mechanism in GSM. [8]
- b) Draw and explain the block diagram of circuit switched technique for data transmission in GSM. [8]

- Q11)**a) Draw the block diagram to explain the forward channel modulation process in CDMA. [8]
- b) Classify the Soft Hand off mechanisms in CDMA. Explain any one in detail with neat diagram. [10]

OR

- Q12)**a) Compare CDMA 2000 and IS-95. [8]
- b) Explain in brief different logical channels used for uplink and downlink in IS-95 CDMA. [10]



Total No. of Questions : 12]

SEAT No. :

P1744

[4859]-99

[Total No. of Pages : 3

B. E. (E&TC)

TELECOMMUNICATION & SWITCHING SYSTEMS

(2008 Course) (Semester-II)

Time : 3Hours]

[Max. Marks : 100]

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Answer 3 questions from section 1 and 3 questions from section 2.*
- 3) *Assume suitable data, if necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) Explain operation of Memory controlled time division switching with a neat block diagram. **[8]**

b) Write a brief note on Digital cross connect systems and explain various functional entities. **[8]**

OR

Q2) a) Explain the various modes of dual processor centralized SPC organization. **[8]**

b) Explain the concept of message switching and packet switching in a typical Store & forward switching network. **[8]**

Q3) a) Define the following terms: **[10]**

- i) Grade of service
- ii) Call Completion Rate
- iii) CCS and CM
- iv) BHCA
- v) Blocking Probability.

b) If sequential selection is used for the group of 5 trunks and traffic offered is 2 E, find how much traffic is carried by: **[8]**

- i) The first choice trunk.
- ii) The last choice trunk.

OR

P.T.O.

- Q4) a)** State and explain 'Constant' and 'Exponential' Holding time Distributions. [8]
- b) During the busy hour, on an average 30 E is offered to a group of trunks. On average, the total period during which all trunks are busy is 12 seconds and 2 calls are lost. Find the average number of calls carried by the group and average call duration. Show that the average number of calls offered to the group during the period equal to the average call duration is 30. [10]

- Q5) a)** Draw and explain in channel and common channel signaling. [8]
- b) Find the grade of service when a total of 30 E is offered to a two stage switching network with 100 incoming and outgoing trunks. The traffic is evenly distributed over the 10 outgoing routes. Also find the traffic capacity of network, if the Grade of service does not exceed 0.01. [8]

OR

- Q6) a)** Design a three stage network that has 100 incoming line and 300 outgoing trucks. Also calculate the total cross points. [8]
- b) Draw and explain Signal exchange diagram for a local call along with timing of signals exchanged. [8]

SECTION-II

- Q7) a)** Explain with block schematic, the interface between TDM transmission link and a digital switch using Elastic Store. [8]
- b) Explain with block schematic, the connections between two autonomously timed digital switches. What are Slips? How are they controlled? [8]

OR

- Q8) a)** What is pulse stuffing approach for network synchronization? Explain in brief. [8]
- b) What is Timing Jitter? Draw and explain block schematic diagrams for measuring Timing Jitter. [8]

- Q9) a)** Explain the terms : functional groups and reference points related to ISDN. [8]
- b) Describe significance of 'B' and 'D' channels in ISDN. [8]

OR

- Q10)a)** Explain ISDN protocol Architecture in detail. [8]
- b) Explain user level and network level signaling in ISDN. [8]

- Q11)** a) Explain and Compare Pure ALOHA with Slotted ALOHA scheme. [8]
b) What is Handoff? Explain the different types of Handoffs. [10]

OR

Q12) Write short note on (any Three) [18]

- a) Frequency Reuse Scheme.
- b) Cell Sectoring.
- c) Cell Splitting.
- d) Enhanced Services in GSM.

